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- (54) **COMPOSITIONS FOR STABILIZING DNA, RNA, AND PROTEINS IN BLOOD AND OTHER BIOLOGICAL SAMPLES DURING SHIPPING AND STORAGE AT AMBIENT TEMPERATURES**
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This patent is subject to a terminal disclaimer.

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(57) **ABSTRACT**

Compositions and methods are disclosed for substantially liquid, gel, suspension, slurry, semisolid and/or colloid storage of biological samples following admixture with the herein disclosed storage composition, permitting substantial recovery of biological activity following storage without refrigeration. In certain embodiments, unfractionated blood or tissue samples may be stored without refrigeration for weeks, months or years in a form that permits recovery of intact DNA, RNA or protein components following the storage period.

14 Claims, 14 Drawing Sheets

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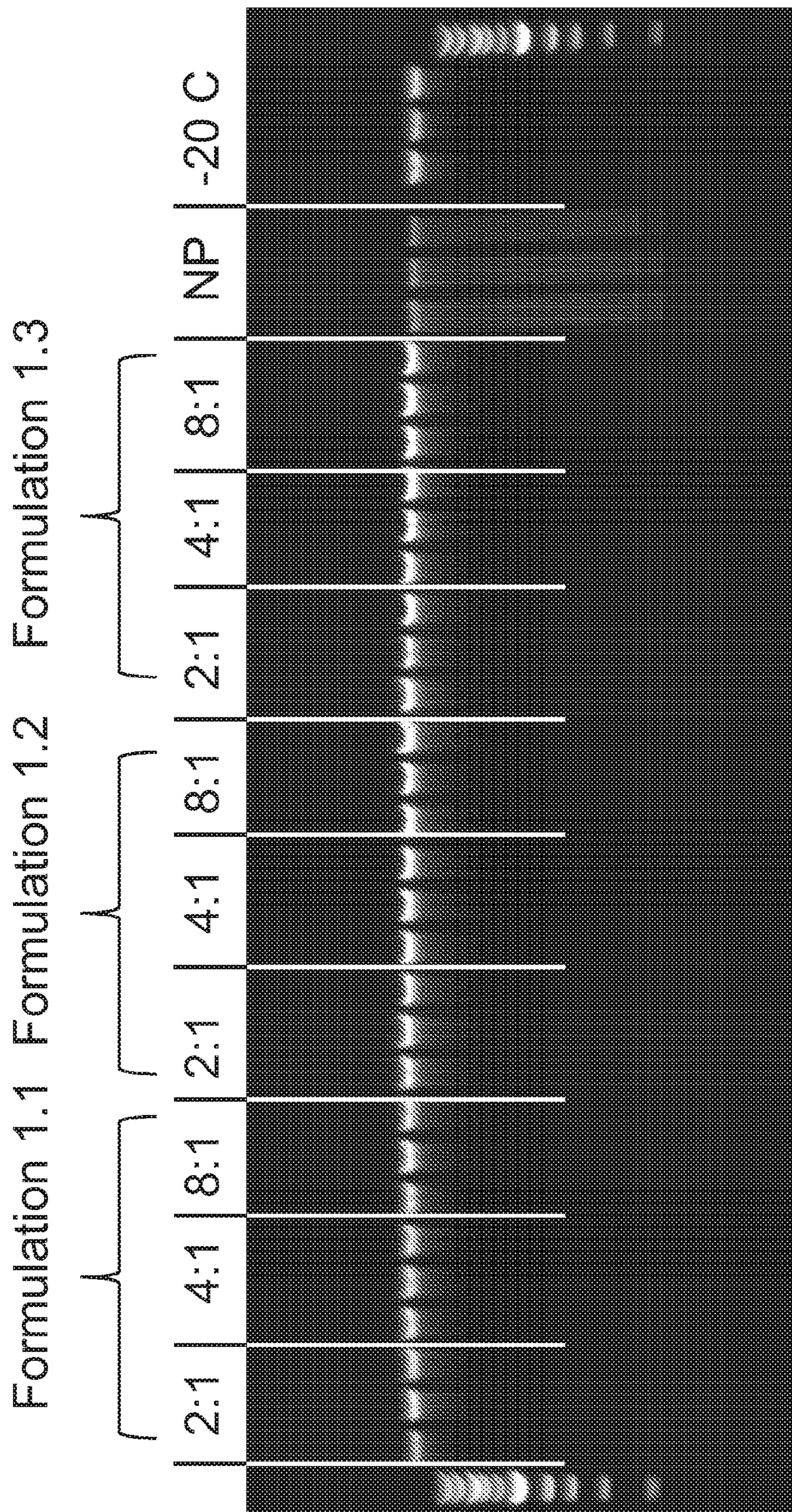


Figure 1

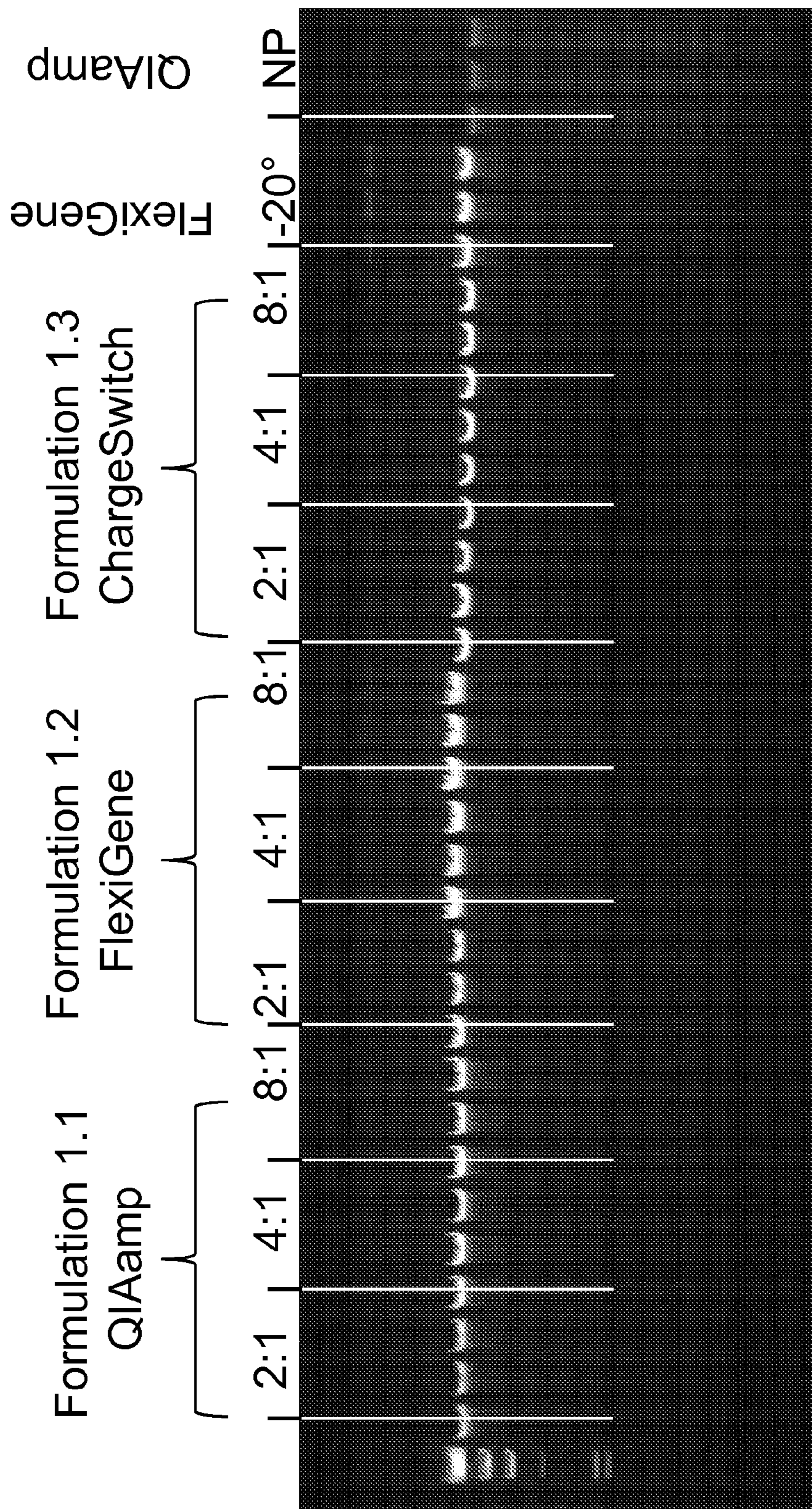


Figure 2

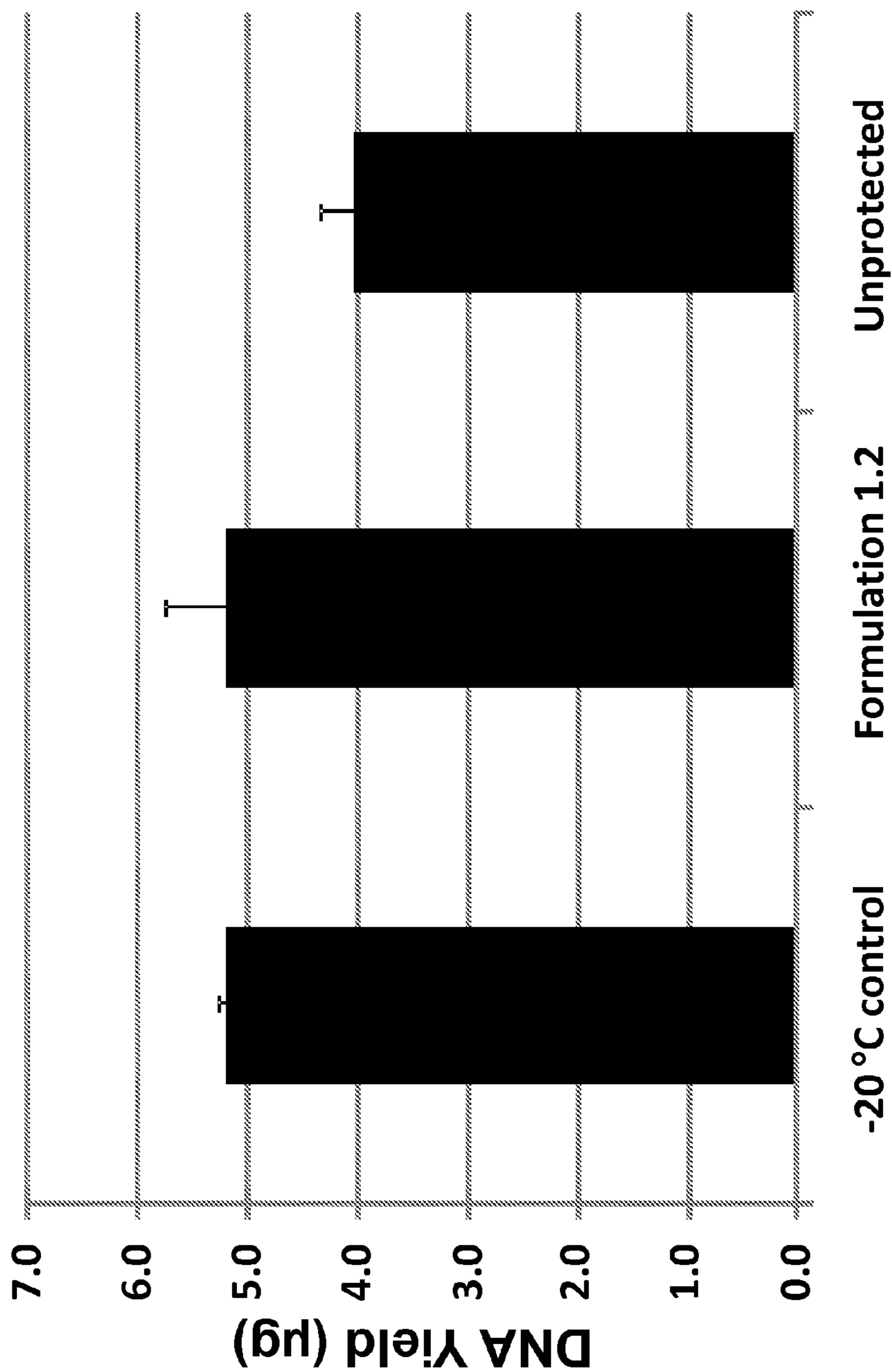


Figure 3

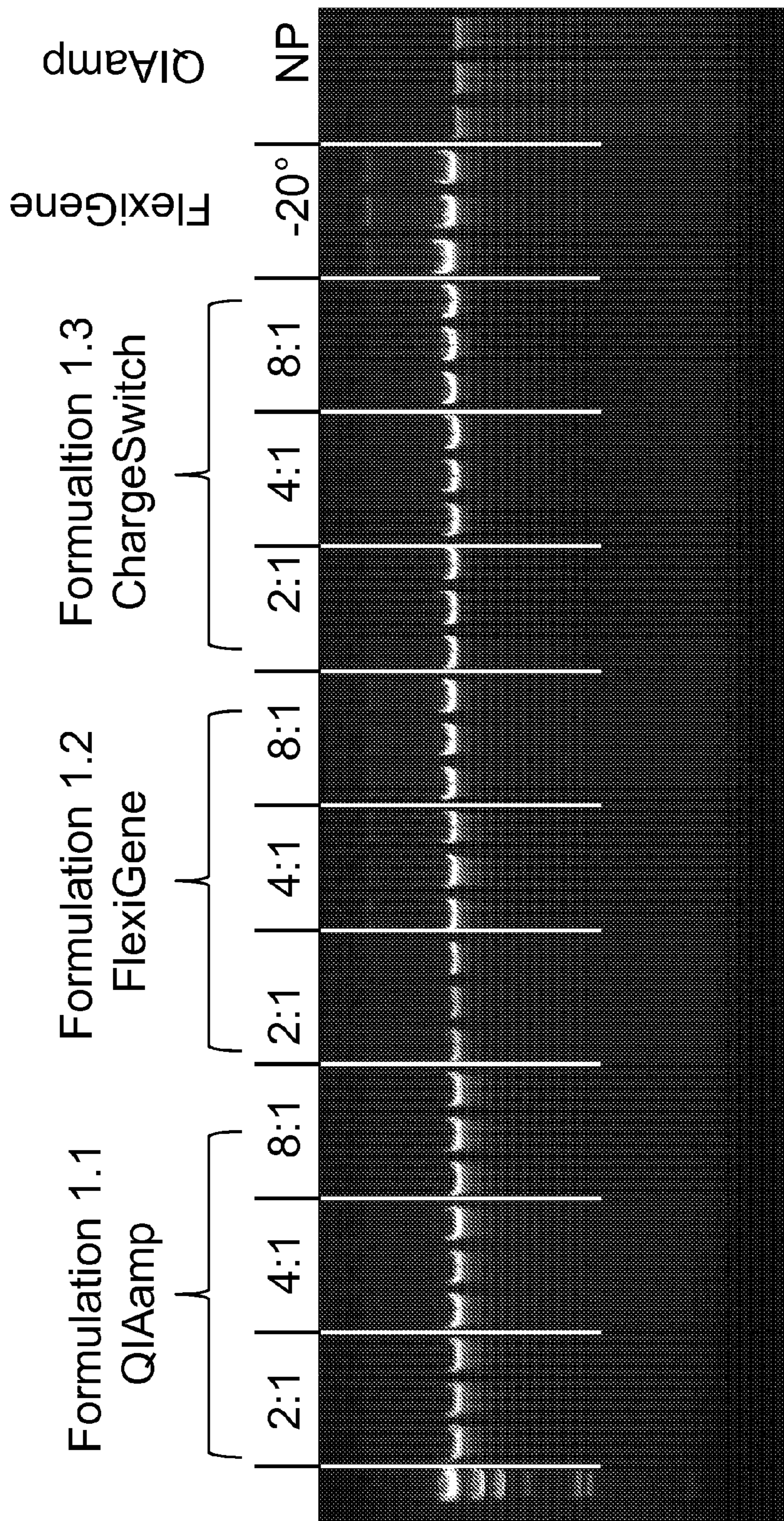


Figure 4

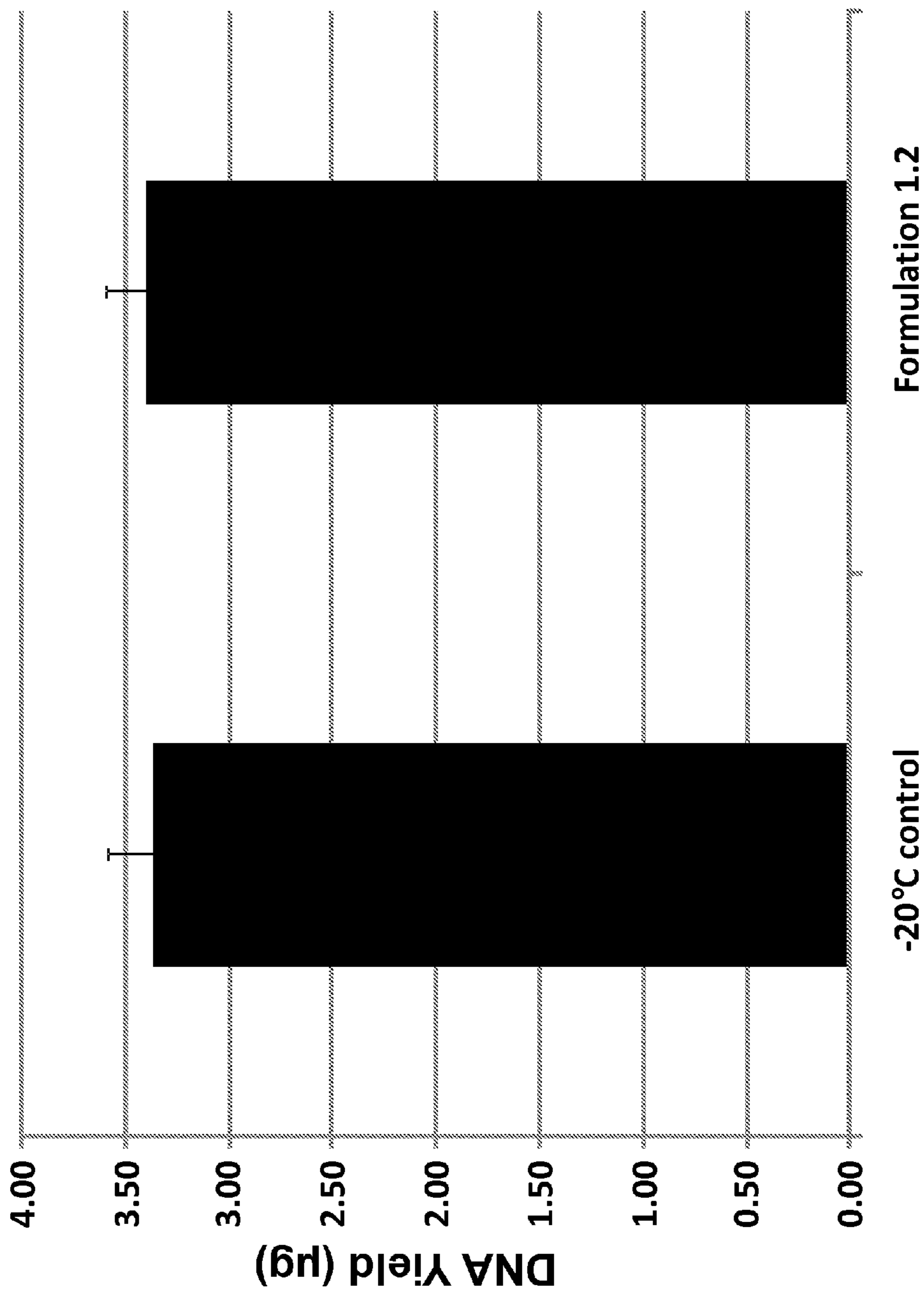


Figure 5

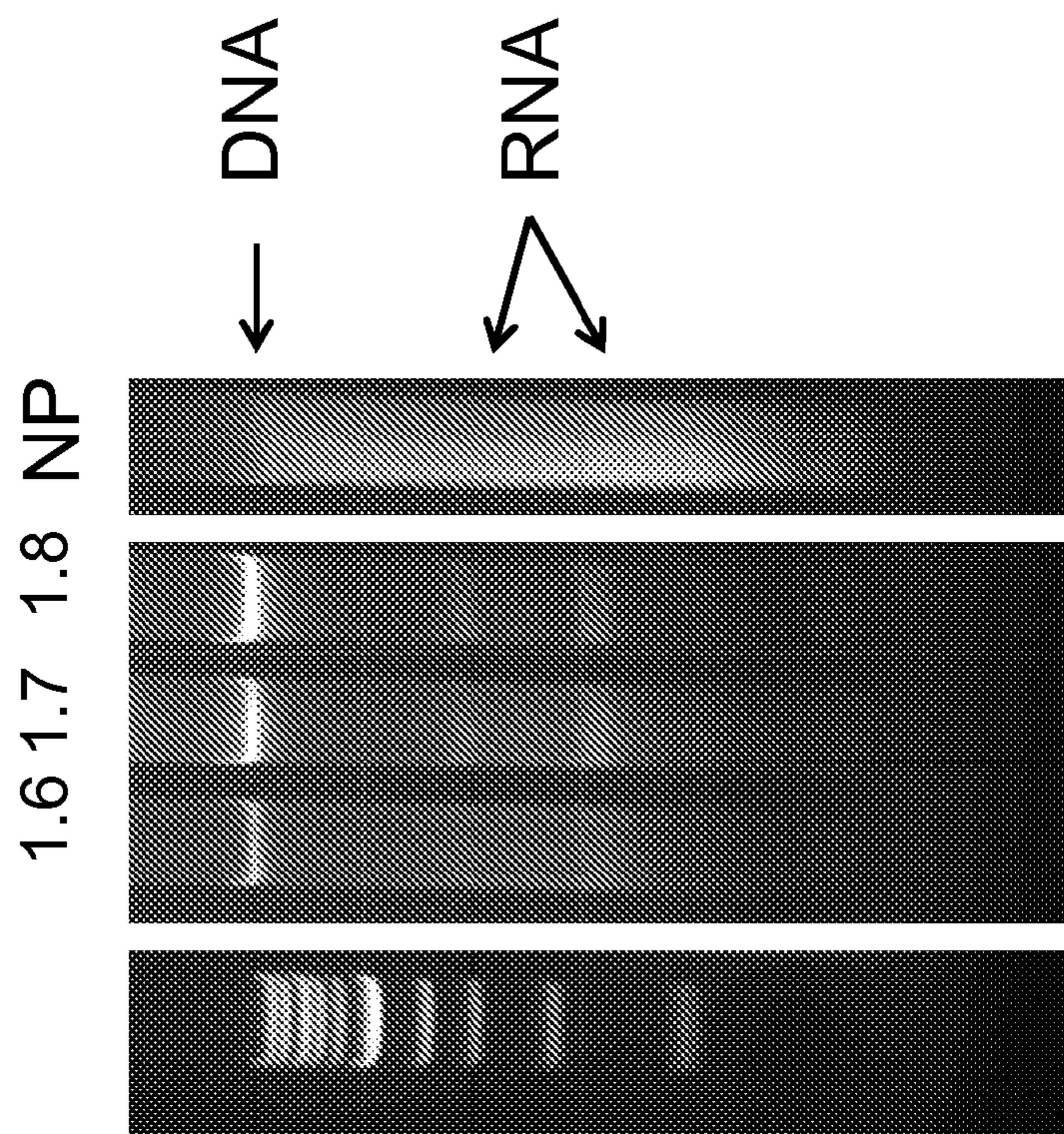


Figure 6

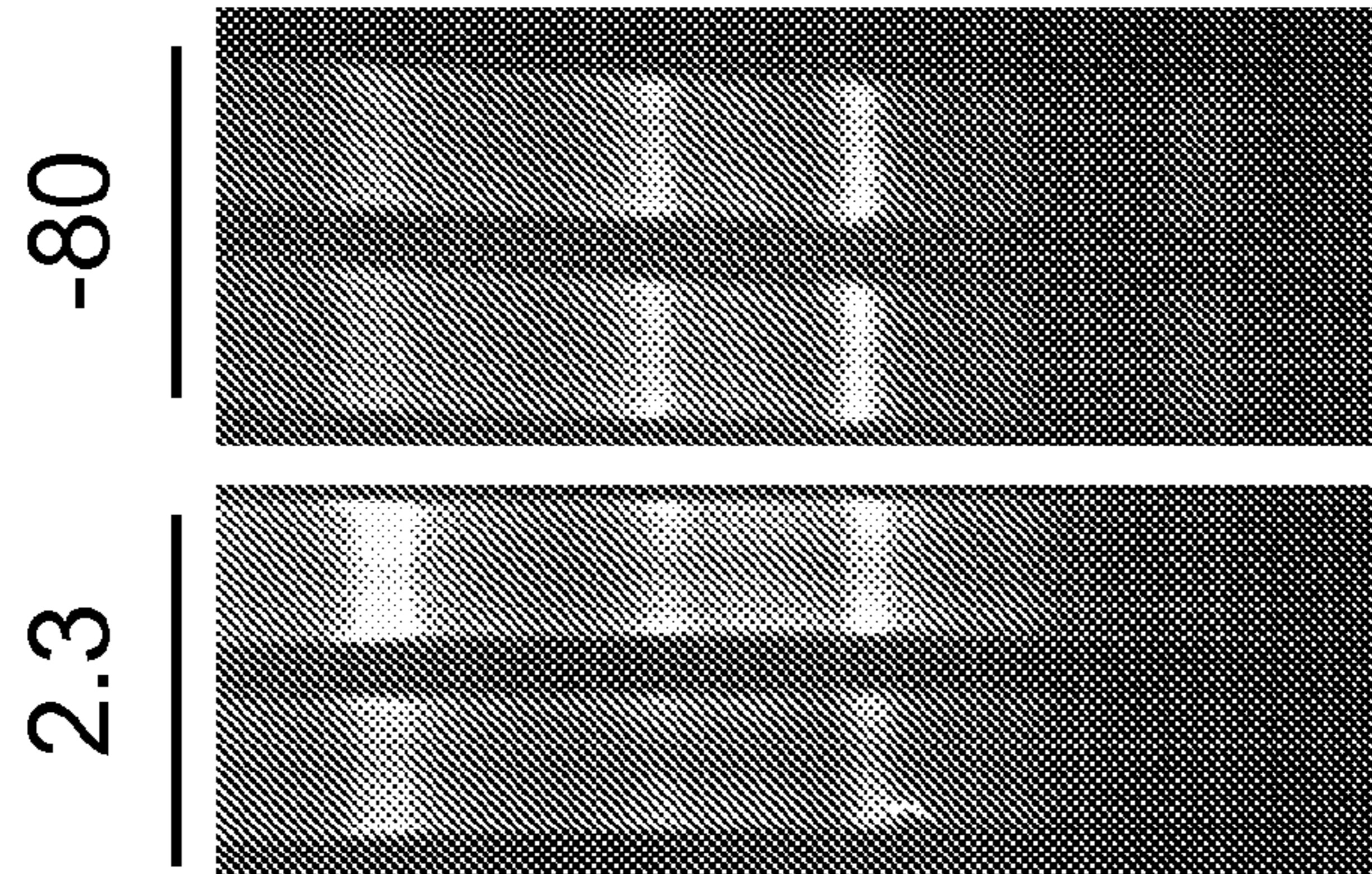


Figure 7

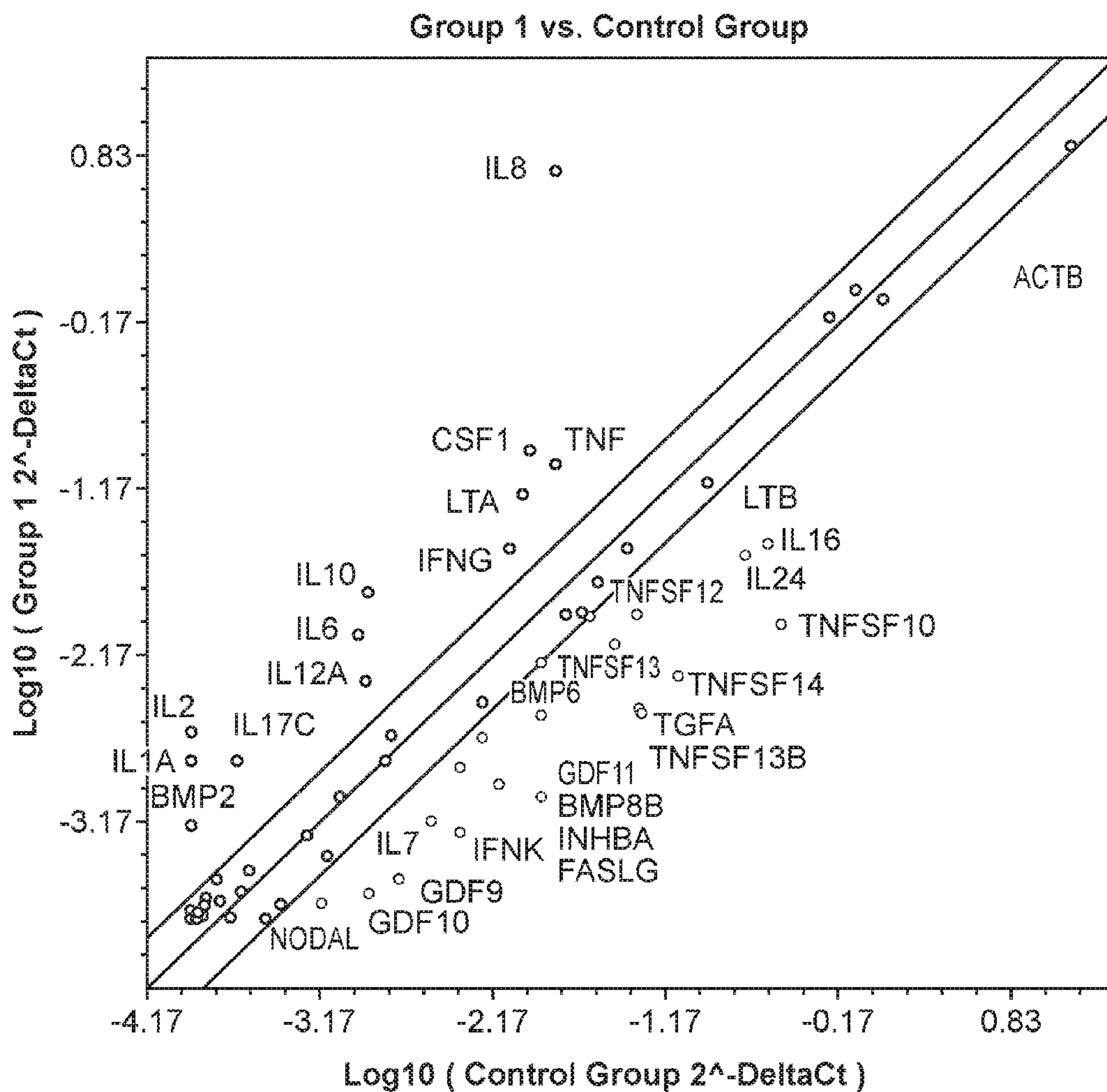


FIG. 8A

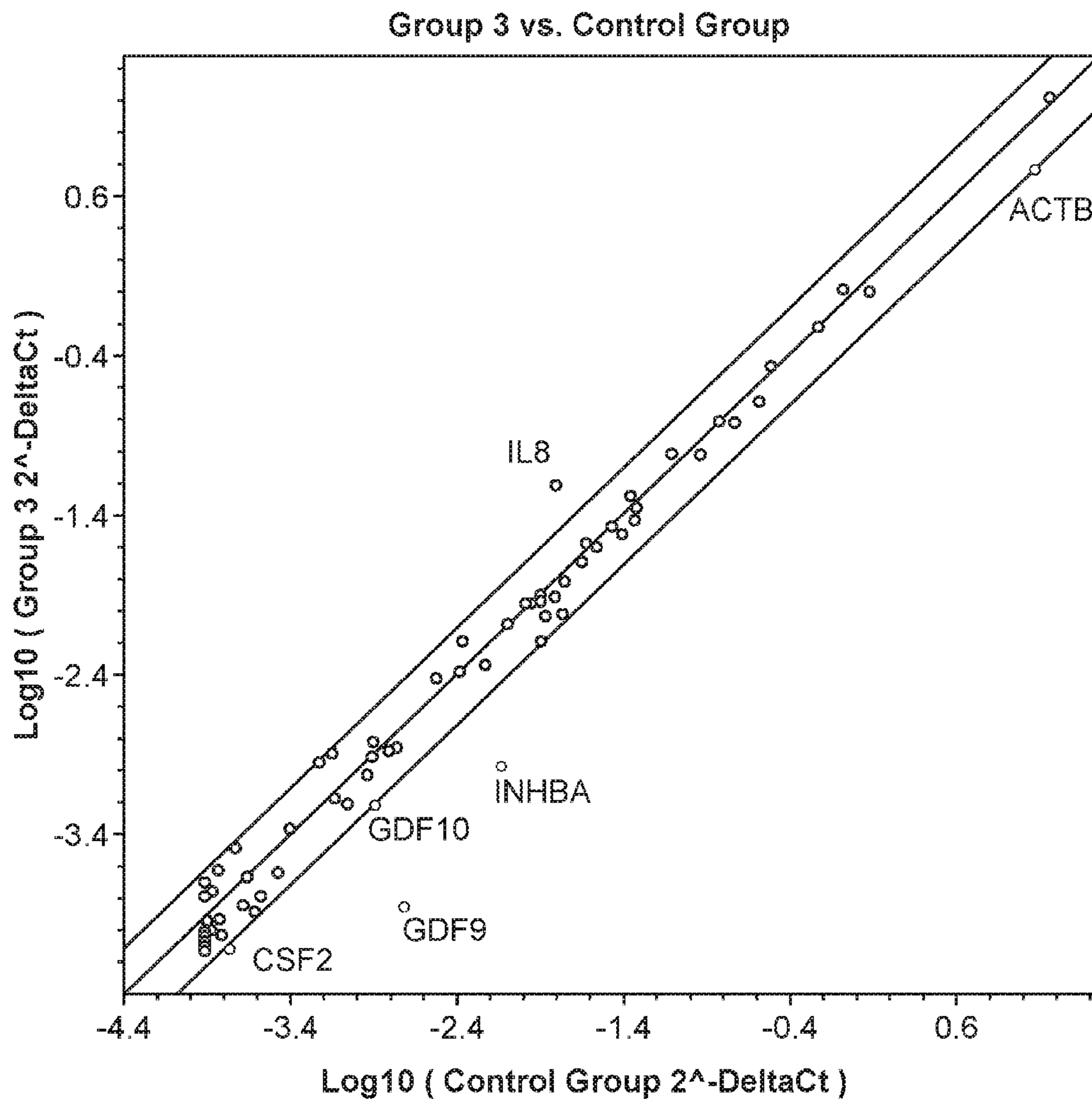


FIG. 8B

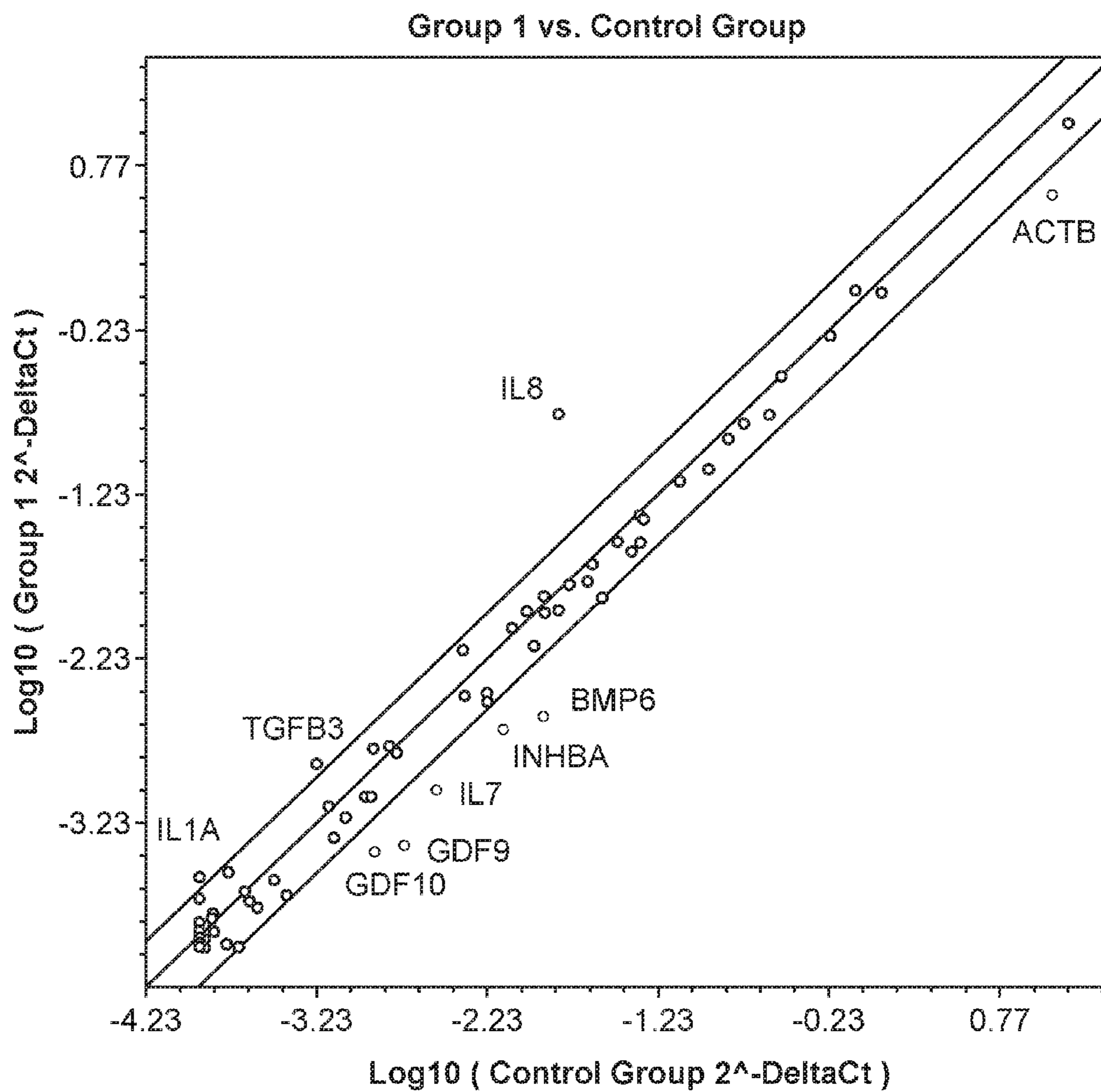


FIG. 8C

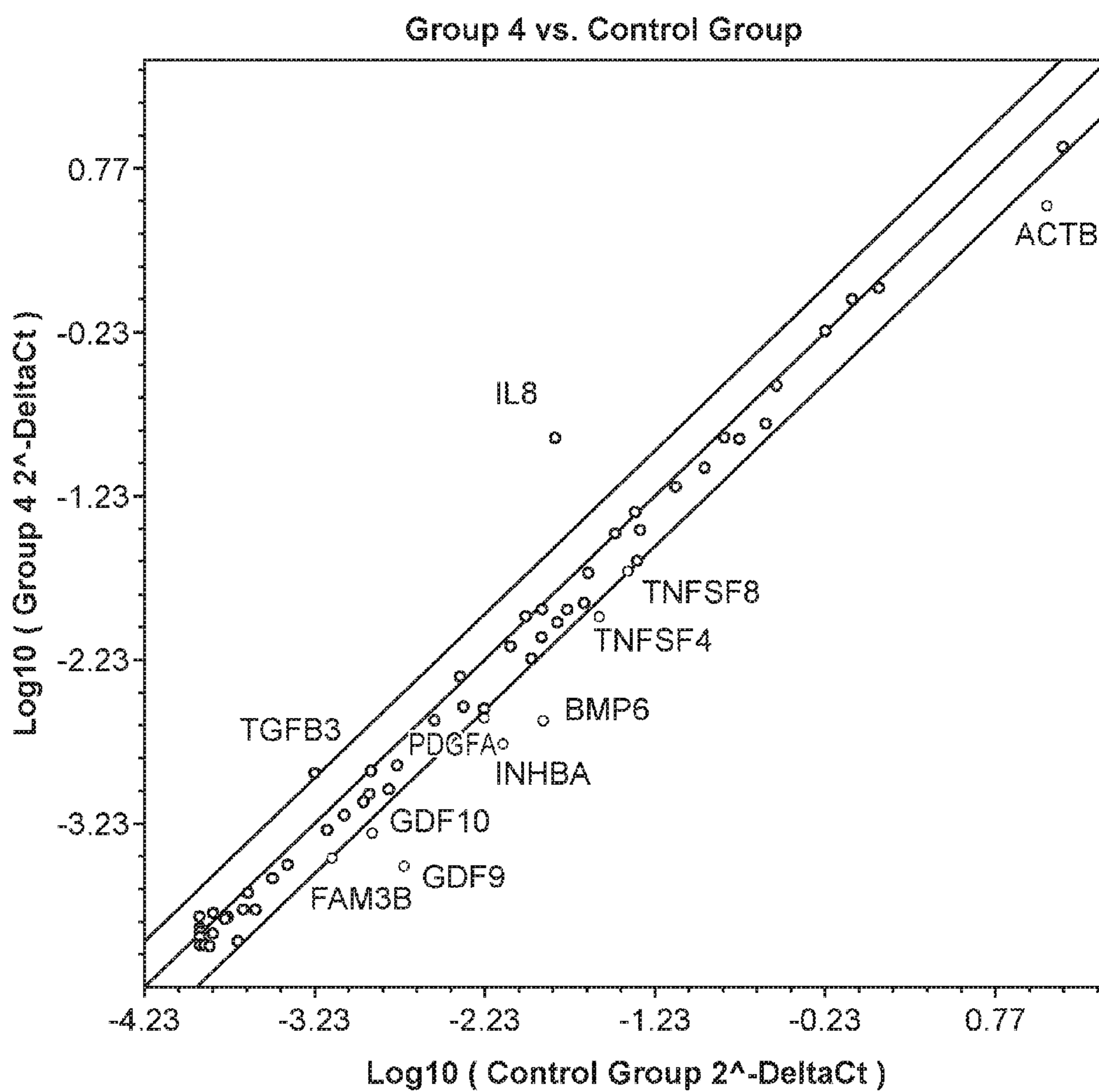


FIG. 8D

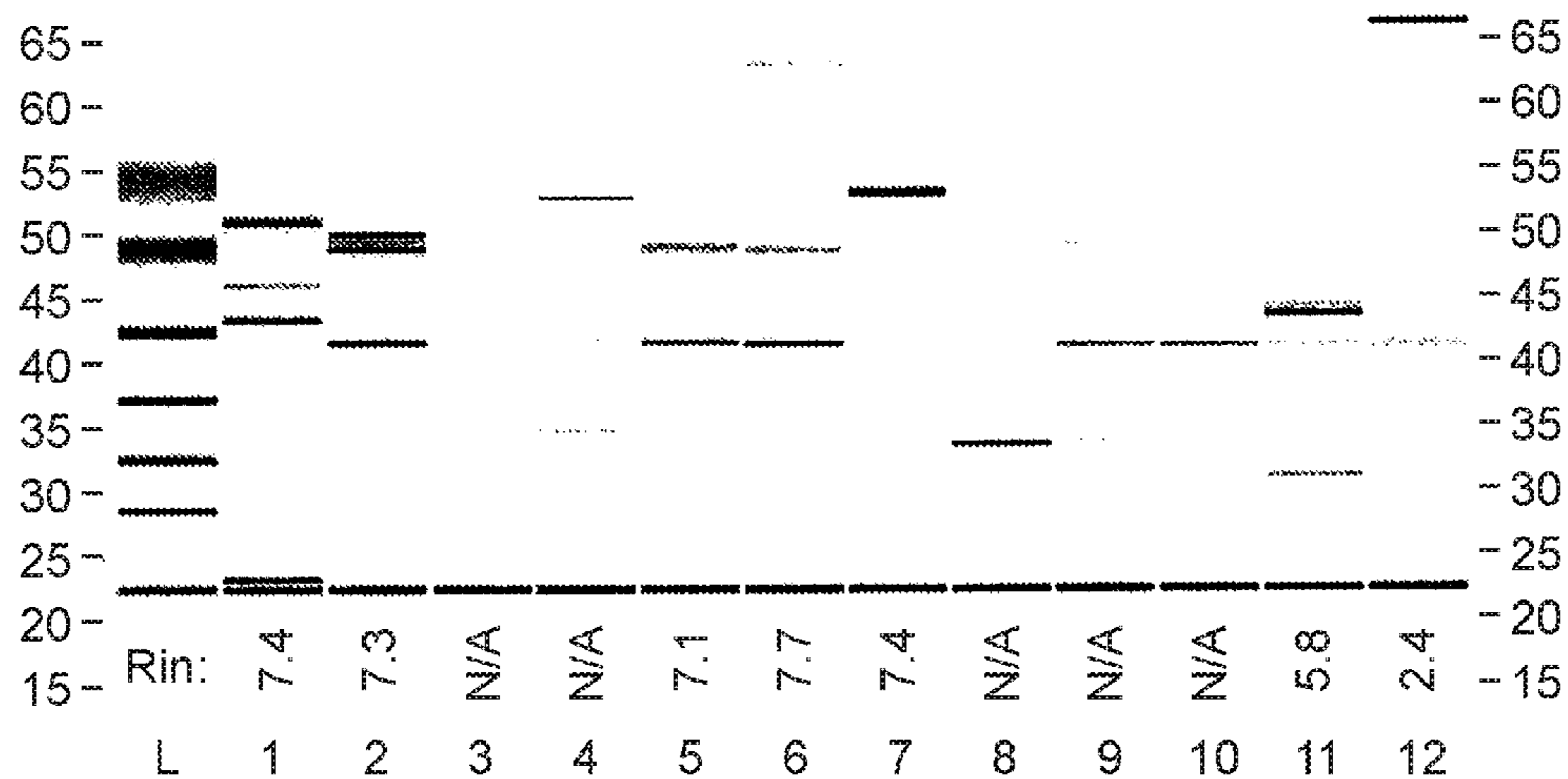


FIG. 9

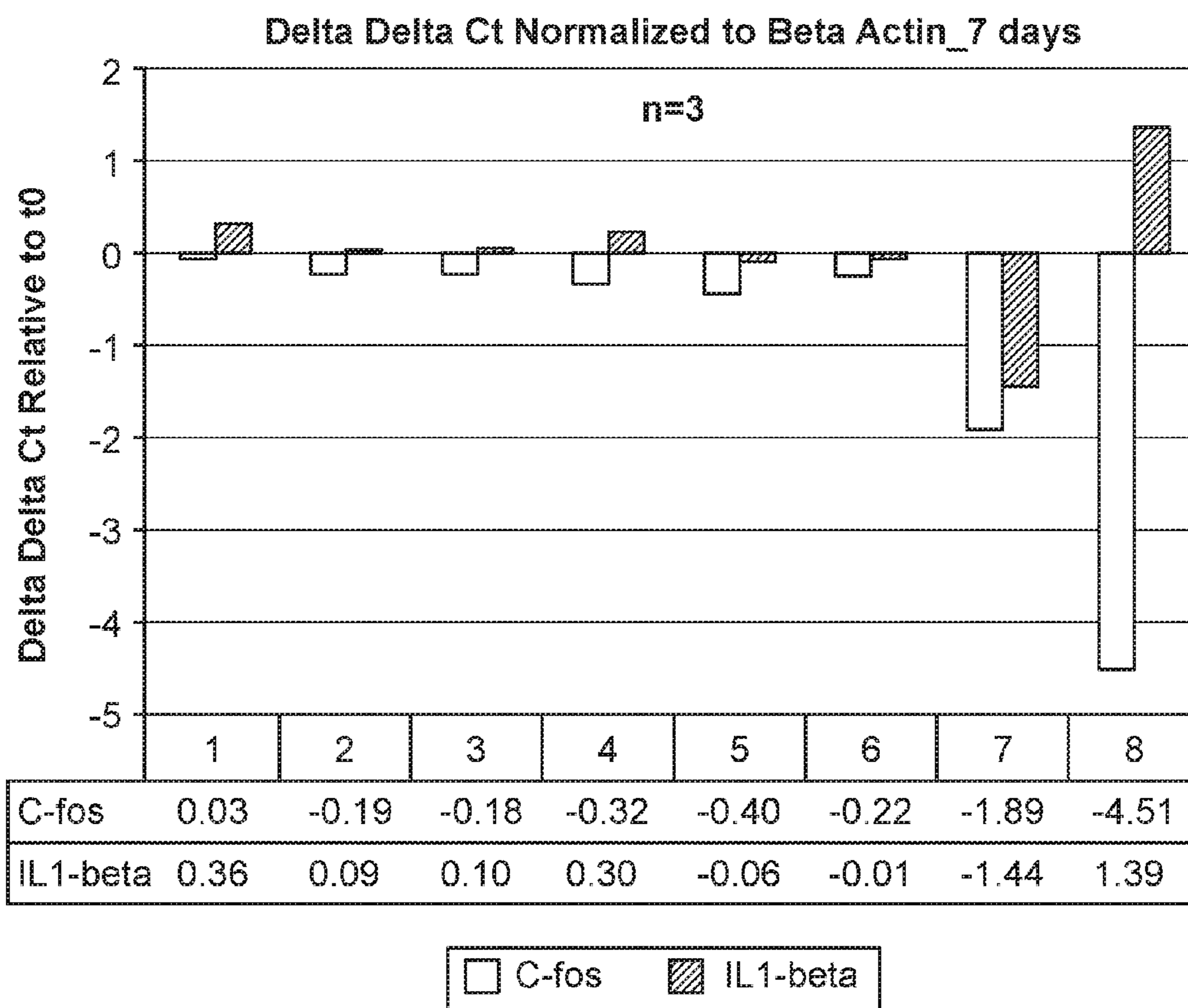


FIG. 10

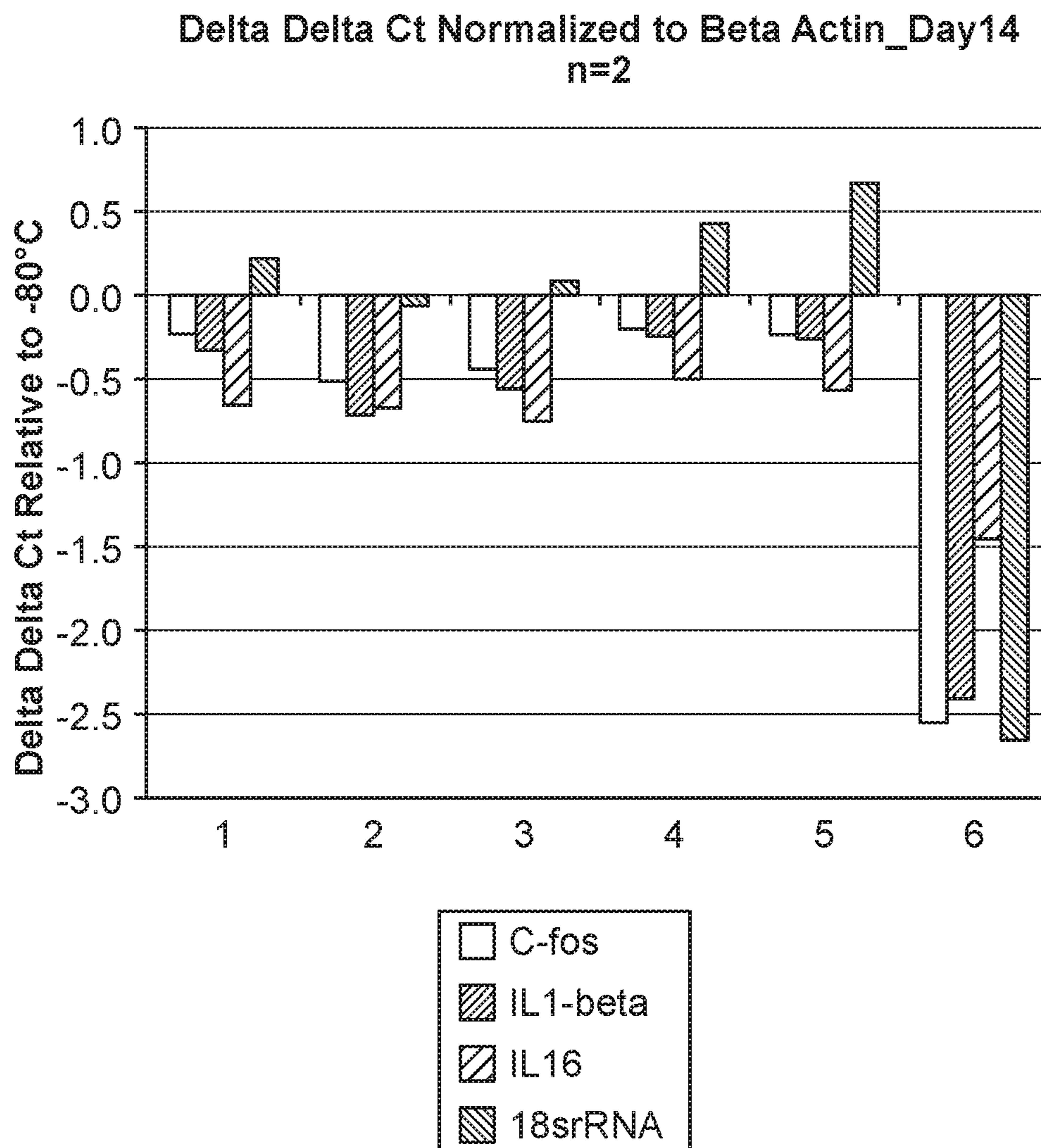


FIG. 11

**COMPOSITIONS FOR STABILIZING DNA,
RNA, AND PROTEINS IN BLOOD AND
OTHER BIOLOGICAL SAMPLES DURING
SHIPPING AND STORAGE AT AMBIENT
TEMPERATURES**

CROSS-REFERENCE TO RELATED
APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 13/191,346, filed Jul. 26, 2011, which claims the benefit of U.S. Provisional Patent Application No. 61/367,786, filed Jul. 26, 2010, all of which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

Technical Field

The present invention relates generally to compositions and methods for biological sample storage.

Description of the Related Art

Research in the life sciences field is based upon the analysis of biological materials and samples, such as DNA, RNA, blood, blood buffy coat cells, urine, buccal swabs, bacteria, archaeobacteria, viruses, phage, plants, algae, yeast, microorganisms, PCR products, cloned DNA, proteins, enzymes, peptides, prions, eukaryotes (e.g., prototista, fungi, plantae and animalia), prokaryotes, cells and tissues, germ cells (e.g., sperm and oocytes), stem cells, sorted (e.g., following immunochemical labeling) or selected (e.g., positively selected or negatively selected) cells, and of minerals or chemicals. Such samples are typically collected or obtained from appropriate sources and placed into storage and inventory for further processing and analysis. Oftentimes, transportation of samples is required, and attention is given to preserve their integrity, sterility and stability. Biological samples can be transported in a refrigerated environment using ice, dry ice or other freezing facility. However, adequate low temperatures often cannot conveniently be maintained for extended time periods such as those required for transportation between countries or continents, particularly where an energy source for the refrigeration device is lacking.

Storage containers for such samples include bottles, tubes, vials, bags, boxes, racks, multi-well dishes and multi-well plates which are typically sealed by individual screw caps or snap caps, snap or seal closures, lids, adhesive strips or tape, or multi-cap strips. The standard container format for medium to high throughput of sample storage, processing and automation of biological processes is a 96-, 384-, or 1536-well plate or array. The containers and the samples contained therein are stored at various temperatures, for example at ambient temperature or at 4° C. or at temperatures below 0° C., typically at about -20° C. or at -70° C. to -80° C. The samples that are placed and stored in the devices are most frequently contained in liquid medium or a buffer solution, and they require storage at such subzero temperatures (e.g., -20° C. or -70 to -80° C.). In some cases, samples are first dried and then stored at ambient temperature (e.g., WO 2005/113147, US 2005/0276728, US 2006/0099567), or at 4° C., at -20° C. or at -70 to -80° C.

For example, presently, nucleic acids are stored in liquid form at low temperatures. For short term storage, nucleic acids can be stored at 4° C. For long-term storage the temperature is generally lowered to -20° C. to -70° C. to prevent degradation of the genetic material, particularly in the case of genomic DNA and RNA. Nucleic acids are also

stored at room temperature on solid matrices such as cellulose membranes. Both storage systems are associated with disadvantages. Storage under low temperature requires costly equipment such as cold rooms, freezers, electric generator back-up systems; such equipment can be unreliable in cases of unexpected power outage or may be difficult to use in areas without a ready source of electricity or having unreliable electric systems. The storage of nucleic acids on cellulose fibers also results in a substantial loss of material during the rehydration process, since the nucleic acid remains trapped by, and hence associated with, the cellulose fibers instead of being quantitatively recoverable. Nucleic acid dry storage on cellulose also requires the subsequent separation of the cellulose from the biological material, since the cellulose fibers otherwise contaminate the biological samples. The separation of the nucleic acids from cellulose filters requires additional handling, including steps of pipetting, transferring of the samples into new tubes or containers, and centrifugation, all of which can result in reduced recovery yields and/or increased opportunity for the introduction of unwanted contaminants and/or exposure to conditions that promote sample degradation, and which are also cost- and labor-intensive.

Proteins are presently handled primarily in liquid form as solutions (e.g., in a compatible aqueous solution containing a salt and/or buffer) or suspensions (e.g., in a saturated ammonium sulfate slurry), in cooled or frozen environments typically ranging from -20° C. to storage in liquid nitrogen (Wang et al., 2007 *J. Pharm. Sci.* 96(1):1-26; Wang, 1999 *Inter. J. of Pharm.* 185: 129-188). In some exceptions proteins may be freeze-dried, or dried at room temperature in the presence of trehalose and applied directly to an untreated surface. (Garcia de Castro et al., 2000 *Appl. Environ. Microbiol.* 66:4142; Manzanera et al., 2002 *Appl. Environ. Microbiol.* 68:4328). Proteins often degrade and/or lose activity even when stored cooled (4° C.), or frozen (-20° C. or -80° C.). The freeze-thaw stress on proteins reduces bioactivity (e.g., enzymatic activity, specific binding to a cognate ligand, etc.) especially if repeated freeze-thawing of aliquots of a protein sample is required. The consequent loss of protein activity that may be needed for biological assays typically requires the readjustment of the protein concentration in order to obtain comparable assay results in successive assays, and oftentimes results in compromised reliability of experimental data generated from such samples.

Drying of proteins and nucleic acids has yet to be universally adopted by the research scientific, biomedical, biotechnology and other industrial business communities because of the lack of standard established and reliable processes, difficulties with recoveries of quantitative and functional properties, variable buffer and solvent compatibilities and tolerances, and other difficulties arising from the demands of handling nucleic acids and proteins. The same problems apply to the handling, storage, and use of other biological materials, such as viruses, phage, bacteria, cells and multicellular organisms. Dissacharides such as trehalose or lactitol, for example, have been described as additives for dry storage of protein-containing samples (e.g., U.S. Pat. No. 4,891,319; U.S. Pat. No. 5,834,254; U.S. Pat. No. 6,896,894; U.S. Pat. No. 5,876,992; U.S. Pat. No. 5,240,843; WO 90/05182; WO 91/14773), but usefulness of such compounds in the described contexts has been compromised by their serving as energy sources for undesirable microbial contaminants, by their limited stabilizing effects when used as described, by their lack of general applicability across a wide array of biological samples, and by other factors.

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The highly labile nature of biological samples makes it extremely difficult to preserve their biological activity over extended time periods. While storing nucleic acids and proteins under freeze-dried conditions (e.g., as lyophilizates) can extend the storage life (shelf-life) of a sample, the subsequent loss of activity upon reconstitution in a liquid makes freeze-drying (e.g., lyophilization) a less than ideal storage technique. Moreover, drying methods cannot be used effectively for other biological materials such as those collected in large volumes, or as swabs of surfaces for biofilm collection, or for some viruses, bacteria, or multicellular organisms. For example, the ability to maintain liquid bacteria cultures under non-selective growth conditions would be particularly desirable during long term transportation, particularly in an environment that retards the growth rate and preserves the survival of the bacteria, but no such ability currently exists. Similarly, the ability to store samples stably and for extended periods in a liquid or semi-liquid environment at ambient or near-ambient temperatures (e.g., about 23° C. to 37° C.) thereby avoiding extreme temperatures (e.g., about 0° C. to -80° C.) would be highly advantageous in maintaining fully functional and intact biological samples, as these are native conditions for many biomolecules. Such capabilities are not, however, presently known.

The degradation of biological samples collected from distant places, be it a foreign country, continent, undersea or outer space, is also currently problematic, as proper analysis and testing of the samples are subsequently compromised and/or delayed. As such, presently available storage technologies for biological samples are not adequate, particularly with regard to preparation or collection of large quantities of proteins or other types of biomolecules that may not be amenable to dry storage, and/or to biological sample modalities for which it is desirable to have a storage capability for long time periods while retaining substantially constant biological activity. For example, in the case of disease outbreak or bioterrorism investigations, such an ability to preserve the integrity of biological samples could be needed, particularly if the sample is collected under extreme environmental conditions and then subjected to variable temperature conditions and/or lengthy transportation to an appropriate facility for analysis. Thus, the ability to store biological samples for extended time periods without the need for time-consuming, impractical, inconvenient and/or costly preservation methods, particularly those that require refrigeration, would be highly advantageous.

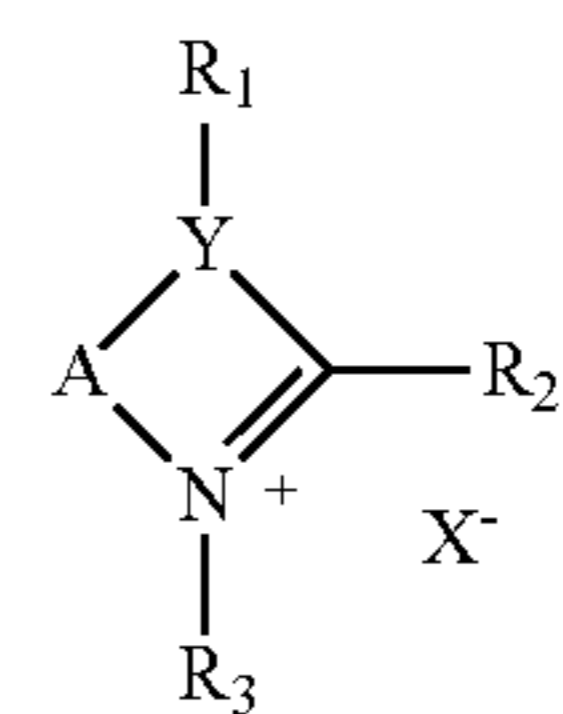
Accordingly, there is clearly a need in the art for compositions and methods for storing biological samples without dehydration for extended time periods (e.g., in excess of two weeks, three weeks, one month, six months, nine months, one year, or longer) while maintaining the biological activity, for instance, for samples collected under extreme environmental conditions (e.g., conditions including, but not limited to, extreme temperatures (e.g., sub-zero or tropical), atmospheric conditions such as increased pressure (e.g., undersea) or low gravity (e.g., outer space), UV radiation, humidity, etc., particularly over extended time periods, without complicated preparations and storage conditions. The presently disclosed embodiments address these needs and offer other related advantages.

BRIEF SUMMARY OF THE INVENTION

According to certain herein provided embodiments, there is provided a composition for substantially stable storage of nucleic acid molecules in a biological sample and/or sub-

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stantially stable storage of protein and/or polypeptide molecules in a biological sample, comprising (a) one or more compounds of formula (I):



where:

A is $—C(R^4)=C(R^4)—$ or $—C(R^4)=C(R^4)—C(R^4)_2—$; Y is N, S or O; R^1 is, when Y is N, C_1-C_8 alkyl, alkenyl, optionally substituted aralkyl, optionally substituted cycloalkyl, optionally substituted cycloalkylalkyl or optionally substituted heterocyclalkyl, and when Y is S or O, R^1 is absent; R^2 is hydrogen, C_1-C_8 alkyl, alkenyl, optionally substituted aralkyl, optionally substituted cycloalkyl, optionally substituted cycloalkylalkyl or optionally substituted heterocyclalkyl; R^3 is C_1-C_{16} alkyl, optionally substituted aryl or optionally substituted aralkyl; each R^4 is independently hydrogen, cyano, nitro, $—C(O)OR^5$, $—C(O)N(R^5)_2$, $—N(R^5)_2$, halo, haloalkyl, hydroxy, alkyl, alkoxy, haloalkoxy, alkoxyalkyl, alkenyl, optionally substituted aryl, optionally substituted aralkyl, optionally substituted cycloalkyl, optionally substituted cycloalkylalkyl, optionally substituted heterocyclalkyl, optionally substituted heterocyclalkyl, optionally substituted heteroaryl or optionally substituted heteroarylalkyl; or two adjacent R^4 's, together with the carbons to which they are attached, may form an optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted heterocyclalkyl or optionally substituted heteroaryl; each R^5 is independently hydrogen, alkyl, aryl or aralkyl; and X is a pharmaceutically acceptable anion; and (b) one, two, or all three of (i) at least one precipitating agent, (ii) at least one lower alcohol, and (iii) at least one chaotrope.

In certain embodiments the composition further comprises one or more of (a) a chelating agent, (b) a reducing agent, (c) a pH buffer, and (d) water. In certain embodiments the pharmaceutically acceptable anion is selected from bromide, chloride, iodide, C_1-C_{12} alkylsulfonate, hexafluorophosphate, methylsulfate, ethylsulfate, tetrafluoroborate, trifluoromethanesulfonate and bis(trifluoromethylsulfonyl) imide.

In certain of the above described embodiments A is $—C(R^4)=C(R^4)—$; R^1 is C_1-C_8 alkyl; R^2 is hydrogen or C_1-C_8 alkyl; and R^3 is C_1-C_{16} alkyl, optionally substituted aryl or optionally substituted aralkyl; each R^4 is independently hydrogen, cyano, nitro, $—C(O)OR^5$, $—C(O)N(R^5)_2$, $—N(R^5)_2$, halo, haloalkyl, hydroxy, alkyl, alkoxy, haloalkoxy, alkoxyalkyl, alkenyl, optionally substituted aryl, optionally substituted aralkyl, optionally substituted cycloalkyl, optionally substituted cycloalkylalkyl, optionally substituted heterocyclalkyl, optionally substituted heterocyclalkyl, optionally substituted heteroaryl or optionally substituted heteroarylalkyl; and each R^5 is independently hydrogen, alkyl, aryl or aralkyl.

In certain embodiments the compound of formula (I) is selected from: 1-methyl-3-carboxyethyl-imidazolium bromide, 1-hexyl-3-methylimidazolium bromide, 1-decyl-3-

methylimidazolium bromide, 1-(2-hydroxyethyl)-3-methylimidazolium bromide, and 1-benzyl-3-hexylimidazolium bromide.

In certain embodiments the precipitating agent is selected from 5-(4-dimethyl)amino benzylidene rhodanine, sulfosalicylic acid, lithium chloride, and lithium hydroxide. In certain embodiments the lower alcohol is selected from methanol, ethanol, n-propanol, isopropanol, n-butanol, and isobutanol (2-methylpropan-1-ol). In certain embodiments the chaotrope is selected from guanidine hydrochloride, guanidine thiocyanate, potassium thiocyanate, sodium thiocyanate and urea. In certain embodiments the chelating agent is selected from diethylenetriaminepentaacetic acid (DTPA), ethylenediaminetetraacetic acid (EDTA), ethylene glycol tetraacetic acid (EGTA), trans-1,2-diaminocyclohexane-N,N,N',N'-tetraacetic acid (CDTA), 1,2-bis(2-aminophenoxy)ethane-N,N,N',N'-tetraacetic acid (BAPTA), 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA), N-(2-hydroxyethyl)ethylenediamine-N,N',N'-triacetic acid, and nitrilotriacetic acid (NTA). In certain embodiments the reducing agent is selected from 2-mercaptoethanol, thiosulfate, TCEP (tris-(2-carboxyethyl) phosphine), dithiothreitol and dithioerythritol. In certain embodiments the pH buffer is selected from citric acid, tartaric acid, malic acid, sulfosalicylic acid, sulfoisophthalic acid, oxalic acid, borate, CAPS (3-(cyclohexylamino)-1-propanesulfonic acid), CAPSO (3-(cyclohexylamino)-2-hydroxy-1-propanesulfonic acid), EPPS (4-(2-hydroxyethyl)-1-piperazinepropanesulfonic acid), HEPES (4-(2-hydroxyethyl)piperazine-1-ethanesulfonic acid), MES (2-(N-morpholino)ethanesulfonic acid), MOPS (3-(N-morpholino)propanesulfonic acid), MOPSO (3-morpholino-2-hydroxypropanesulfonic acid), PIPES (1,4-piperazinediethanesulfonic acid), TAPS (N-[tris(hydroxymethyl)methyl]-3-aminopropanesulfonic acid), TAPSO (2-hydroxy-3-[tris(hydroxymethyl)methylamino]-1-propanesulfonic acid), TES (N-[tris(hydroxymethyl)methyl]-2-aminoethanesulfonic acid), bicine (N,N-Bis(2-hydroxyethyl)glycine), tricine (N-[Tris(hydroxymethyl)methyl]glycine), tris (tris(hydroxymethyl)aminomethane) and bis-tris (2-[Bis(2-hydroxyethyl)amino]-2-(hydroxymethyl)-1,3-propanediol).

In certain embodiments the composition further comprises a surfactant or a detergent, which in certain embodiments is selected from Triton® X-100, Nonidet® P40 and a Brij® detergent. In certain embodiments the nucleic acid molecules comprise one or more of DNA molecules and RNA molecules. In certain embodiments the biological sample comprises vertebrate blood, which in certain further embodiments is unfractionated. In certain embodiments the biological sample comprises human blood, which in certain further embodiments is unfractionated. In certain embodiments the biological sample is selected from DNA, RNA, blood, buffy coat from blood, urine, feces, serum, serosal fluid, plasma, lymph, cerebrospinal fluid, saliva, mucosal secretion, vaginal fluid, ascites fluid, pleural fluid, pericardial fluid, peritoneal fluid, abdominal fluid, cell culture medium, organ culture medium, buccal cells, bacteria, viruses, yeast cells, plasmid DNA, mRNA, tRNA, rRNA, siRNA, micro RNA, hnRNA, cDNA, a protein, a polypeptide, a lipid, a glycolipid, a glycoprotein, an oligosaccharide, a polysaccharide, a vaccine, a cell, a sorted or selected cell, a tissue, a cell lysate, homogenate or extract, a tissue lysate, homogenate or extract, a blood sample, biopsy specimen, tissue explant, organ culture and a biological fluid.

In certain other embodiments there is provided a substantially stably-stored nucleic acid molecule from a biological

sample, comprising the biological sample admixed with any of the above described composition. In certain embodiments there is provided a substantially stably-stored nucleic acid molecule from a vertebrate blood sample, comprising vertebrate blood admixed with any of the above described compositions. In certain embodiments there is provided a substantially stably-stored polypeptide molecule from a human blood sample, comprising human blood admixed with any of the above described compositions. In certain further embodiments the nucleic acid molecule comprises one or more of a DNA molecule and an RNA molecule.

In certain embodiments the above described composition is capable, following admixture with a first sample of unfractionated human blood to obtain a test mixture and storage of the test mixture without refrigeration for a time period of at least 60 days, of substantially preventing degradation of at least 70% of recoverable DNA from the test mixture, relative to DNA recoverable from a second sample of said unfractionated human blood that is stored at -20° C. during said time period. In certain embodiments the above described composition is capable, following admixture with a first sample of unfractionated human blood to obtain a test mixture and storage of the test mixture without refrigeration for a time period of at least 21 days, of substantially preventing degradation of at least 70% of recoverable RNA from the test mixture, relative to RNA recoverable from a second sample of said unfractionated human blood that is stored at -80° C. during said time period.

Turning to another embodiment there is provided a method for substantially stabilizing one or a plurality of nucleic acid or polypeptide molecules that are present in a biological sample, comprising (a) admixing the biological sample with any of the above described compositions to obtain a mixture; and (b) maintaining the mixture without refrigeration for a time period of at least 7 days, and thereby substantially stabilizing said one or a plurality of nucleic acid or polypeptide molecules that are present in the biological sample, wherein either one, two or all three of: (i) degradation is substantially prevented of at least 70% of recoverable DNA in the mixture, relative to an amount of DNA or polypeptide that is recoverable from the sample when stored for the time period at -20° C. without any of the above described compositions, (ii) degradation is substantially prevented of at least 70% of recoverable RNA in the mixture, relative to an amount of RNA that is recoverable from the sample when stored for the time period at -80° C. without any of the above described compositions, and (iii) degradation is substantially prevented of at least 70% of recoverable polypeptide molecules in the mixture, relative to an amount of polypeptide molecules that is recoverable from the sample when stored for the time period at -20° C. without any of the above described compositions.

In certain further embodiments the biological sample comprises vertebrate blood, which in certain still further embodiments is unfractionated. In certain other embodiments the biological sample comprises human blood, which in certain further embodiments is unfractionated. In certain other embodiments the biological sample is selected from DNA, RNA, blood, blood buffy coat, urine, feces, serum, serosal fluid, plasma, lymph, cerebrospinal fluid, saliva, mucosal secretion, vaginal fluid, ascites fluid, pleural fluid, pericardial fluid, peritoneal fluid, abdominal fluid, cell culture medium, organ culture medium, buccal cells, bacteria, viruses, yeast cells, plasmid DNA, mRNA, tRNA, rRNA, siRNA, micro RNA, hnRNA, cDNA, a protein, a polypeptide, a lipid, a glycolipid, a glycoprotein, an oligosaccharide, a polysaccharide, a vaccine, a cell, a sorted or selected cell,

a tissue, a cell lysate, homogenate or extract, a tissue lysate, homogenate or extract, a blood sample, biopsy specimen, tissue explant, organ culture and a biological fluid. In certain other embodiments the step of maintaining comprises main-
 5 taining for a time period of at least 10, 20, 30, 40, 50, 60 or 70 days.

These and other aspects of the present invention will become apparent upon reference to the following detailed description and attached drawings. All references disclosed herein are hereby incorporated by reference in their entirety
 10 as if each was incorporated individually.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. 1 shows integrity of genomic DNA extracted from whole human blood using a Qia Amp™ mini-column (Qia-
 gen, Valencia, Calif.) following storage for 31 days at room temperature following admixture at indicated ratios (vol/
 vol) with one of three different formulations each compris-
 15 ing a composition comprising the compound of formula (I).

FIG. 2 shows integrity of genomic DNA extracted from whole human blood using either a Qia Amp™ mini-column (Qia-
 gen, Valencia, Calif.), a Flexigene™ kit (Qiagen) or a ChargeSwitch™ kit (Life Technologies, Carlsbad, Calif.)
 20 following storage for 62 days at room temperature following admixture at indicated ratios (vol/vol) with one of three different formulations each comprising a composition comprising the compound of formula (I).

FIG. 3 shows DNA yields as determined by spectropho-
 25 tometric quantification of DNA extracted from 100 μL of whole human blood with the Flexigene™ kit (Qiagen) following storage for 62 days: (-20° C. control), at -20° C.; (Formulation), at room temperature following admixture (4:1, vol/vol) with a composition comprising the compound of formula (I); (Unprotected), at room temperature with no
 30 additives.

FIG. 4 shows integrity of genomic DNA extracted from whole human blood using either a Qia Amp™ mini-column (Qia-
 gen, Valencia, Calif.), a Flexigene™ kit (Qiagen) or a ChargeSwitch™ kit (Life Technologies, Carlsbad, Calif.)
 35 following a shipping simulation and storage for 36 days at room temperature following admixture at indicated ratios (vol/vol) with one of three different formulations each comprising a composition comprising the compound of formula (I).

FIG. 5 shows DNA yields as determined by spectropho-
 40 tometric quantification of DNA extracted from 100 μL of whole human blood with the Flexigene™ kit (Qiagen) following a shipping simulation and storage for 36 days: (-20° C. control), at -20° C.; (Formulation), shipping simu-
 45 lation followed by 36 days at room temperature following admixture (4:1, vol/vol) with a composition comprising the compound of formula (I).

FIG. 6 shows RNA recovery from whole blood using a RiboPure™ Blood kit (Ambion/Applied Biosystems, Aus-
 50 tin, Tex.) following storage for 14 days at room temperature after admixture (1:4, vol/vol) with each of three formula-
 tions (6-8) that contain a composition comprising the com-
 55 pound of formula (I). M, nucleic acid marker ladder; NP, not
 60 protected; -20, storage at -20° C.

FIG. 7 shows RNA recovery from whole blood using a RiboPure™ Blood kit (Ambion/Applied Biosystems, Aus-
 65 tin, Tex.) following storage for 6 days at room temperature after admixture (1:4, vol/vol) with a formulation (#3) that
 contains a composition comprising the compound of formula (I). NP, not protected; -80, storage at -80° C.

FIGS. 8A-8D show RT-qPCR analysis of gene expression in a whole blood sample stored at room temperature in the presence of formulation 3.4 (Table 3). FIG. 8A, blood stored at room temperature with no stabilizer for three days; FIG. 8B, blood stored at -80° C. with no stabilizer for seven days; FIG. 8C, blood stored at room temperature with formulation 3.4 for three days; FIG. 8D, blood stored at room tempera-
 5 ture with formulation 3.4 for seven days.

FIG. 9 shows RNA integrity (RIN) analysis in blood samples stored under various conditions: L, polynucleotide standard ladder; lanes 1-2, blood stored at -80° C. with no stabilizer; lanes 3-4, blood stored at room temperature with formulation 3.4 (Table 3); lanes 5-6, blood stored at room temperature with formulation 3.20 (Table 3); lanes 7-8, blood stored at room temperature with formulation 3.22 (Table 3); lanes 9-10, blood stored at room temperature with no additive; lanes 11-12, blood stored at room temperature with PAXgene™.
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FIG. 10 shows RT-qPCR analysis of c-fos and IL-1β gene expression in a whole blood sample. Lane 1, blood stored at -80° C. with no additive; lane 2, blood stored at room temperature with formulation 3.20 (Table 3); lane 3, blood stored at room temperature with formulation 3.21 (Table 3); lane 4, blood stored at room temperature with formulation 3.23 (Table 3); lane 5, blood stored at room temperature with formulation 3.24 (Table 3); lane 6, blood stored at room temperature with formulation 3.25 (Table 3); lane 7, blood stored at room temperature with PAXgene™ lane 8, blood stored at room temperature with no additive.
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FIG. 11 shows RT-qPCR analysis of c-fos, IL-1β, IL-16 and 18S rRNA gene expression in a whole blood sample stored at room temperature for 14 days in the presence of: 1, formulation 3.20 (Table 3); 2, formulation 3.21 (Table 3); 3, formulation 3.23 (Table 3); 4, formulation 3.24 (Table 3); 5, formulation 3.25 (Table 3); 6, PAXgene™.
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DETAILED DESCRIPTION

The present invention is directed in certain embodiments as described herein to compositions and methods for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample, based on the unexpected discovery that in the presence of (a) certain compositions of formula (I) as disclosed herein in greater detail below, and (b) one, two or all three of at least one precipitating agent, at least one lower alcohol and at least one chaotrope as also disclosed in greater detail below; and, in certain further embodiments as elaborated upon below, (c) one or more of a chelating agent, a reducing agent, a pH buffer, and water; a biological sample can be stored in liquid or semi-liquid form at ambient temperature for extended periods of time, such that nucleic acids and/or polypeptides in the sample are substantially protected from degradation that might otherwise occur and substantially all of the biological activity of the sample can be recovered. Accordingly and as described herein, certain embodiments relate in part to advantages provided by selection of one or more compounds of formula (I) and additional components of the composition for substantially stable storage as provided herein, which are compatible with preserving structure and/or activity of nucleic acid molecules and/or polypeptide molecules in a biological sample.
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Certain non-limiting embodiments also relate in part to surprising advantages provided upon admixture of a herein described composition for substantially stable storage with particular types of biological samples that contain nucleic acid and/or polypeptide molecules. For instance, upon
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admixture of whole blood with certain herein described compositions for substantially stable storage, an increase (e.g., in a statistically significant manner relative to an appropriate control, such as an admixture lacking one or more of the composition constituents) in viscosity may be observed which manifests as formation of a viscous liquid, a semi-liquid, gel, suspension, colloid or the like. Such a change in the fluid state of the sample may afford advantageous ease of handling and/or storage, for example, by reducing the potential for loss or contamination of the sample in the course of transporting or archiving the container in which it is being stored, or as another example, by rendering the viscous mixture more amenable to certain processing steps (including automated or semi-automated processing, such as by robotics equipment) that would otherwise be difficult with freely flowing liquid materials.

These and related embodiments permit efficient, convenient and economical storage, transportation, handling and processing of a wide variety of biological samples as provided herein including, but not limited to, polynucleotides, enzymes and other proteins, polypeptides, tissues and cells, without refrigeration or frozen storage. Samples may be stored following admixture of a sample with the herein described composition for substantially stable storage (e.g., contact of the sample with, and mixing in the presence of, the storage composition to afford coating of the sample with the storage composition, which in the case of a substantially liquid sample such as blood will afford a substantially uniform mixture) at ambient temperature.

Following storage, which in preferred embodiments as described herein pertains to storage without refrigeration (e.g., without the need for subjecting the sample-storage composition mixture to significantly reduced temperatures such as lowered sample temperatures that are commonly introduced through the use of refrigerators, freezers or lodging of the sample container in the presence of a coolant or refrigerant such as ice, dry ice or any naturally or artificially chilled medium), the samples may be processed or analyzed for nucleic acid molecules and/or polypeptides contained therein by isolating such biomolecules from other components of the sample while at the same time separating them from the storage composition, which does not compromise the biological activity of the nucleic acid and/or polypeptide molecules. Embodiments provided herein offer advantageously superior recoveries of intact nucleic acid and/or polypeptide molecules from stored biological samples, and may find uses in clinical, healthcare and diagnostic contexts, in biomedical research, biological research and forensic science, and in biological products and other settings where stable sample storage for life sciences may be desired, including in particular situations where refrigeration (including freezing) may be unavailable, unreliable, impractical, expensive, inefficient or otherwise untenable.

According to certain contemplated embodiments there is provided a method for substantially stabilizing one or a plurality of nucleic acid and/or polypeptide molecules that are present in a biological sample, comprising admixing the biological sample with the herein described composition for substantially stable biological sample storage to obtain a mixture; and maintaining the mixture without refrigeration for a time period of at least 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 or more days. Depending on the sample and the type of biomolecule being stabilized, the time period may in certain contemplated embodiments be at least 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 or more weeks, or at least 6, 7, 8,

9, 10, 11, 12, 13, 14, 15, 16, 17, 18 or more months, or at least 1, 2, 3, 4, 5 or more years.

Admixture of the biological sample and the herein described composition for substantially stable biological sample storage may typically be performed using a range of volumetric ratios of the sample to the storage composition, such as a ratio of from about 10 parts sample to one part storage composition (10:1, vol/vol) to about 1 part sample to 10 parts storage composition (1:10, vol/vol), or a ratio therebetween, for instance, 6:1, 5:1, 4:1, 3:1, 2:1, 1:1, 1:2, 1:3, 1:4, 1:5, or 1:6, or any other ratio including intermediate ratios between those just exemplified, which may be determined empirically by the skilled artisan from the disclosure herein, and which may vary as a function of the particular sample and the particular storage composition being employed. Typically, the mixture of sample and storage composition will have a pH between about pH 3 and about pH 10, which may also vary as a function of the particular sample and the particular storage composition being employed, and which may also be determined empirically by the skilled artisan from the disclosure herein. For example, for substantially stable storage of RNA the pH range may be from about pH 3 to about pH 8, preferably in certain embodiments from about pH 3 to about pH 6.5 (e.g., about pH 3.2, 3.5, 3.7, 4.0, 4.2, 4.5, 4.7, 5.0, 5.3, 5.5, 5.8, 6.0, 6.3 or 6.5). For substantially stable storage of DNA the pH range may be from about pH 5 to about pH 10, preferably in certain embodiments from about pH 6 to about pH 9 (e.g., about pH 6.3, 6.5, 6.8, 7.0, 7.4, 7.8, 8.0, 8.2, 8.4, 8.6, 8.8 or 9.0).

Preferably in certain of these and related embodiments, the herein described composition for substantially stable biological sample storage substantially prevents degradation of at least 70% of recoverable DNA, RNA and/or polypeptides in the mixture, relative to an amount of DNA, RNA or polypeptide that is recoverable from the sample when stored for the same time period at -20° C. without the herein described composition for substantially stable biological sample storage. The extended time periods without refrigeration during which the presently disclosed compositions and methods provide stabilization of DNA, RNA and/or polypeptides against degradative effects such as heat, light and/or enzymes (e.g., nucleases, proteases) that may be present in the biological sample are unprecedented, unexpected and advantageous.

For example, in certain embodiments as described herein, storage artifacts may hinder efforts to assess accurately the relative representation in a biological sample of one or more polynucleotides having particular nucleic acid sequences (e.g., mRNA) within a heterogeneous nucleic acid population (e.g., total RNA or total RNA-plus-DNA), due (according to non-limiting theory) to different degradation rates of particular RNA and/or DNA species over time during storage. Consequently, "snapshot" efforts to characterize such a sample at different points in time may lead to dramatically different results, such as disparate quantification values for the relative presence of particular RNA/DNA species over time, leading to erroneous calculation of, e.g., gene expression activity at the time the sample was collected. Improved stabilization as is provided by the herein described embodiments may therefore usefully reduce (e.g., decrease in a statistically significant manner) or substantially eliminate such artifacts, by impairing sample degradation and thus avoiding biases in the composition of the sample that may vary over time.

In other preferred embodiments, the herein described composition for substantially stable biological sample stor-

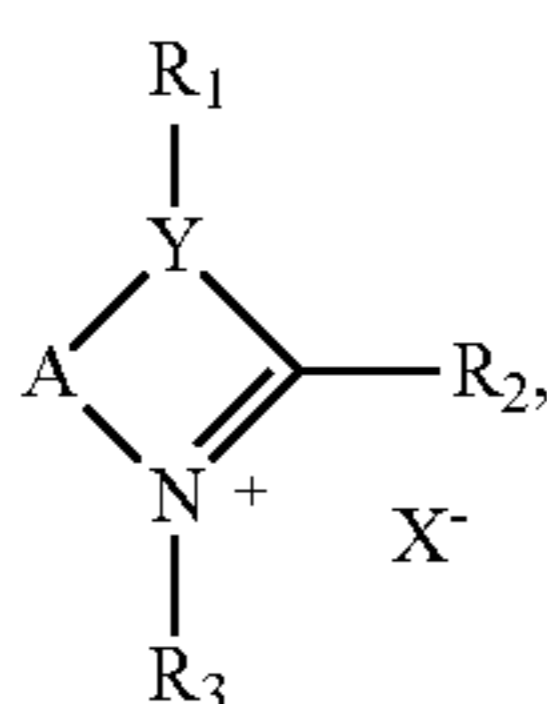
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age substantially prevents degradation of at least 75%, 80%, 85%, 90%, 95% or more of the recoverable DNA, RNA and/or polypeptides in the mixture, relative to an amount of DNA, RNA or polypeptide that is recoverable from the sample when stored for the same time period at -20°C . without the herein described composition for substantially stable biological sample storage. In other preferred embodiments, the herein described composition for substantially stable biological sample storage substantially prevents degradation of at least 75%, 80%, 85%, 90%, 95% or more of the recoverable DNA, RNA and/or polypeptides in the mixture, relative to an amount of DNA, RNA or polypeptide that is recoverable from the sample when stored for the same time period at less than -20°C ., -30°C ., -40°C ., -50°C ., -60°C ., -70°C ., or -80°C . without the herein described composition for substantially stable biological sample storage. Still other embodiments contemplate the herein described storage methods in which the temperature at which the mixture is maintained may vary significantly over time, including variable portions of the time period that may include refrigeration or freezing, such as may occur in the course of certain shipping itineraries.

Composition for Substantially Stable Biological Sample Storage

According to non-limiting theory, a composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample, may, as provided herein, comprise one or more compounds of formula (I) and one, two or all three of (i) at least one precipitating agent, (ii) at least one lower alcohol, and (iii) at least one chaotrope, and may comprise a molecular structure that, by forming a matrix (e.g., a spatially organized support or scaffold), creates a three dimensional space which allows constituent biological material of the biological sample to associate with the matrix. Further according to non-limiting theory, the composition for substantially stable storage of nucleic acid and polypeptide molecules may also be used in certain contemplated embodiments to spatially organize the introduction of one or more additional agents that may beneficially stabilize, preserve, protect or otherwise contribute to the recovery of nucleic acid and/or protein molecules from the biological sample, such as salts, sugars, inhibitors, buffers and/or other stabilizers. The storage composition also allows inclusion of components (e.g., buffers) for the adjustment of pH and other parameters (e.g., by one or more chelating agents and/or reducing agents) for optimal storage conditions, and may optionally comprise one or a plurality of detectable indicators as provided herein, such as color-based pH indicators, and/or other chemical indicators.

In certain preferred embodiments the stable storage composition comprises one or more compounds of formula (I):



where:

A is $-\text{C}(\text{R}^4)=\text{C}(\text{R}^4)-$ or $-\text{C}(\text{R}^4)=\text{C}(\text{R}^4)-\text{C}(\text{R}^4)_2-$;
 Y is N, S or O;

R^1 is, when Y is N, C_1 - C_8 alkyl, alkenyl, optionally substituted aralkyl, optionally substituted cycloalkyl,

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optionally substituted cycloalkylalkyl or optionally substituted heterocyclalkyl, and when Y is S or O, R^1 is absent;

R^2 is hydrogen, C_1 - C_8 alkyl, alkenyl, optionally substituted aralkyl, optionally substituted cycloalkyl, optionally substituted cycloalkylalkyl or optionally substituted heterocyclalkyl;

R^3 is C_1 - C_{16} alkyl, optionally substituted aryl or optionally substituted aralkyl;

each R^4 is independently hydrogen, cyano, nitro, $-\text{C}(\text{O})\text{OR}^5$, $-\text{C}(\text{O})\text{N}(\text{R}^5)_2$, $-\text{N}(\text{R}^5)_2$, halo, haloalkyl, hydroxy, alkyl, alkoxy, haloalkoxy, alkoxyalkyl, alkenyl, optionally substituted aryl, optionally substituted aralkyl, optionally substituted cycloalkyl, optionally substituted cycloalkylalkyl, optionally substituted heterocyclalkyl, optionally substituted heterocyclalkyl, optionally substituted heteroaryl or optionally substituted heteroarylalkyl;

or two adjacent R^4 's, together with the carbons to which they are attached, may form an optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted heterocyclalkyl or optionally substituted heteroaryl;

each R^5 is independently hydrogen, alkyl, aryl or aralkyl; and

X is a pharmaceutically acceptable anion.

Definitions

Certain chemical groups named herein may be preceded by a shorthand notation indicating the total number of carbon atoms that are to be found in the indicated chemical group. For example; C_1 - C_8 alkyl describes an alkyl group, as defined below, having a total of 1 to 8 carbon atoms. The total number of carbons in the shorthand notation does not include carbons that may exist in substituents of the group described.

In addition to the foregoing, as used in the specification and appended claims, unless specified to the contrary, the following terms have the meaning indicated:

“Alkyl” refers to a straight or branched hydrocarbon chain radical consisting solely of carbon and hydrogen atoms, containing no unsaturation, having from one to 16 carbon atoms, preferably one to eight carbon atoms for R^1 , R^2 and R^4 in compounds of formula (I) as set forth herein, or preferably four to sixteen carbon atoms for R^3 in compounds of formula (I), and which is attached to the rest of the molecule by a single bond, e.g., methyl, ethyl, n-propyl, 1-methylethyl (iso-propyl), n-butyl, n-pentyl, 1,1-dimethylethyl (t-butyl), 3-methylhexyl, 2-methylhexyl, and the like.

“Alkenyl” refers to a straight or branched hydrocarbon chain radical group consisting solely of carbon and hydrogen atoms, containing at least one double bond, having from two to twelve carbon atoms, preferably two to eight carbon atoms and which is attached to the rest of the molecule by a single bond, e.g., ethenyl, prop-1-enyl, but-1-enyl, pent-1-enyl, penta-1,4-dienyl, and the like.

“Alkylene” or “alkylene chain” refers to a straight or branched divalent hydrocarbon chain linking the rest of the molecule to a radical group, consisting solely of carbon and hydrogen, containing no unsaturation and having from one to twelve carbon atoms, e.g., methylene, ethylene, propylene, n-butylene, and the like. The alkylene chain is attached to the rest of the molecule through a single bond and to the radical group through a single bond. The points of attachment of the alkylene chain to the rest of the molecule and to the radical group can be through one carbon or any two carbons within the chain.

“Alkoxy” refers to a radical of the formula $-\text{OR}$, where R_a is an alkyl radical as defined above.

“Alkoxyalkyl” refers to a radical of the formula $-R_b-$
 $O-R_a$ where R_b is an alkylene chain as defined above and
 R_a is an alkyl radical as defined above. The oxygen atom
 may be bonded to any carbon in the alkylene chain and in the
 alkyl radical.

“Aryl” refers to a hydrocarbon ring system radical com-
 prising hydrogen, 6 to 18 carbon atoms and at least one
 aromatic ring. For purposes of this invention, the aryl radical
 may be a monocyclic, bicyclic, tricyclic or tetracyclic ring
 system, which may include fused or bridged ring systems.
 Aryl radicals include, but are not limited to, aryl radicals
 derived from aceanthrylene, acenaphthylene, acephenan-
 thrylene, anthracene, azulene, benzene, chrysene, fluo-
 ranthene, fluorene, as-indacene, s-indacene, indane, indene,
 naphthalene, phenalene, phenanthrene, pleiadene, pyrene,
 and triphenylene.

“Aralkyl” refers to a radical of the formula $-R_b-R_c$
 where R_b is an alkylene chain as defined above and R_c is one
 or more aryl radicals as defined above, for example, benzyl,
 diphenylmethyl and the like. The aryl part of the aralkyl
 radical may be optionally substituted as described above for
 an aryl group.

“Cycloalkyl” refers to a stable non-aromatic monocyclic
 or polycyclic hydrocarbon radical consisting solely of car-
 bon and hydrogen atoms, which may include fused or
 bridged ring systems, having from three to fifteen carbon
 atoms, preferably having from three to ten carbon atoms,
 and which is saturated or unsaturated and attached to the rest
 of the molecule by a single bond. Monocyclic radicals
 include, for example, cyclopropyl, cyclobutyl, cyclopentyl,
 cyclohexyl, cycloheptyl, and cyclooctyl. Polycyclic radicals
 include, for example, adamantyl, norbornyl, decalyl, and
 the like. Unless otherwise stated specifically in the specifi-
 cation, the term “optionally substituted cycloalkyl” is meant
 to include cycloalkyl radicals which are optionally substi-
 tuted by one or more substituents independently selected
 from the group consisting of alkyl, alkenyl, halo, haloalkyl,
 haloalkenyl, cyano, nitro, oxo, aryl, aralkyl, cycloalkyl,
 cycloalkylalkyl, heterocyclyl, heterocyclylalkyl, heteroaryl,
 heteroarylalkyl, $-R^{15}-OR^{14}$, $-R^{15}-OC(O)-R^{14}$,
 $-R^{15}-N(R^{14})_2$, $-R^{15}-C(O)R^{14}$, $-R^{15}-C(O)OR^{14}$,
 $-R^{15}-C(O)N(R^{14})_2$, $-R^{15}-N(R^{14})C(O)OR^{16}$, $-R^{15}-$
 $N(R^{14})C(O)R^{16}$, $-R^{15}-N(R^{14})S(O)_tR^{16}$ (where t is 1 to 2),
 $-R^{15}-N=C(OR^{14})R^{14}$, $-R^{15}-S(O)_tOR^{16}$ (where t is 1
 to 2), $-R^{15}-S(O)_pR^{16}$ (where p is 0 to 2), and $-R^{15}-S$
 $(O)_tN(R^{14})_2$ (where t is 1 to 2) where each R^{14} is indepen-
 dently hydrogen, alkyl, haloalkyl, cycloalkyl, cycloalkylal-
 kyl, aryl, aralkyl, heterocyclyl, heterocyclylalkyl, heteroaryl
 or heteroarylalkyl; each R^{15} is independently a direct bond
 or a straight or branched alkylene or alkenylene chain; and
 each R^{16} is alkyl, haloalkyl, cycloalkyl, cycloalkylalkyl,
 aryl, aralkyl, heterocyclyl, heterocyclylalkyl, heteroaryl
 or heteroarylalkyl. These optional substituents, including the
 R^{14} and R^{16} substituents, may be optionally substituted as
 defined herein.

“Cycloalkylalkyl” refers to a radical of the formula
 $-R_bR_g$ where R_b is an alkylene chain as defined above and
 R_g is a cycloalkyl radical as defined above.

“Halo” refers to bromo, chloro, fluoro or iodo.

“Haloalkyl” refers to an alkyl radical, as defined above,
 that is substituted by one or more halo radicals, as defined
 above, e.g., trifluoromethyl, difluoromethyl, trichlorom-
 ethyl, 2,2,2-trifluoroethyl, 1-fluoromethyl-2-fluoroethyl,
 3-bromo-2-fluoropropyl, 1-bromomethyl-2-bromoethyl, and
 the like.

“Haloalkoxy” refers to an alkoxy radical, as defined
 above, that is substituted by one or more halo radicals, as

defined above, e.g., trifluoromethoxy, difluoromethoxy,
 trichloromethoxy, 2,2,2-trifluoroethoxy and the like.

“Heterocyclyl” refers to a stable 3- to 18-membered
 non-aromatic ring radical which consists of two to twelve
 carbon atoms and from one to six heteroatoms selected from
 the group consisting of nitrogen, oxygen and sulfur. Unless
 stated otherwise specifically in the specification, the hetero-
 cyclyl radical may be a monocyclic, bicyclic, tricyclic or
 tetracyclic ring system, which may include fused or bridged
 ring systems; and the nitrogen, carbon or sulfur atoms in the
 heterocyclyl radical may be optionally oxidized; the nitro-
 gen atom may be optionally quaternized; and the heterocy-
 cyclyl radical may be partially or fully saturated. Examples of
 such heterocyclyl radicals include, but are not limited to,
 dioxolanyl, thienyl[1,3]dithianyl, decahydroisoquinolyl,
 imidazolanyl, imidazolidinyl, isothiazolidinyl, isoxazolidi-
 nyl, morpholinyl, octahydroindolyl, octahydroisoindolyl,
 2-oxopiperazinyl, 2-oxopiperidinyl, 2-oxopyrrolidinyl,
 oxazolidinyl, piperidinyl, piperazinyl, 4-piperidonyl, pyrro-
 lidinyl, pyrazolidinyl, quinuclidinyl, thiazolidinyl, tetrahy-
 drofuryl, trithianyl, tetrahydropyranyl, thiomorpholinyl,
 thiamorpholinyl, 1-oxo-thiomorpholinyl, and 1,1-dioxo-
 thiomorpholinyl. Unless stated otherwise specifically in the
 specification, the term “optionally substituted heterocyclyl”
 is meant to include heterocyclyl radicals as defined above
 which are optionally substituted by one or more substituents
 selected from the group consisting of alkyl, alkenyl, halo,
 haloalkyl, haloalkenyl, cyano, oxo, thiooxo, nitro, aryl,
 aralkyl, cycloalkyl, cycloalkylalkyl, heterocyclyl, heterocy-
 cyclalkyl, heteroaryl, heteroarylalkyl, $-R^{15}-OR^{14}$,
 $-R^{15}-OC(O)-R^{14}$, $-R^{15}-N(R^{14})_2$, $-R^{15}-C(O)R^{14}$,
 $-R^{15}-C(O)OR^{14}$, $-R^{15}-C(O)N(R^{14})_2$, $-R^{15}-N(R^{14})$
 $C(O)OR^{16}$, $-R^{15}-N(R^{14})C(O)R^{16}$, $-R^{15}-N(R^{14})S(O)_t$
 R^{16} , (where t is 1 to 2), $-R^{15}-N=C(OR^{14})R^{14}$, $-R^{15}-$
 $S(O)_tOR^{16}$ (where t is 1 to 2), $-R^{15}-S(O)_pR^{16}$ (where p is
 0 to 2), and $-R^{15}-S(O)_tN(R^{14})_2$ (where t is 1 to 2) where
 each R^{14} is independently hydrogen, alkyl, alkenyl,
 haloalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, hetero-
 cyclyl, heterocyclylalkyl, heteroaryl or heteroarylalkyl; each
 R^{15} is independently a direct bond or a straight or branched
 alkylene or alkenylene chain; and each R^{16} is alkyl, alkenyl,
 haloalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, hetero-
 cyclyl, heterocyclylalkyl, heteroaryl or heteroarylalkyl.
 These optional substituents, including the R^{14} and R^{16}
 substituents, may be optionally substituted as defined herein.

“Heterocyclylalkyl” refers to a radical of the formula
 $-R_bR_h$ where R_b is an alkylene chain as defined above and
 R_h is a heterocyclyl radical as defined above, and if the
 heterocyclyl is a nitrogen-containing heterocyclyl, the het-
 erocyclyl may be attached to the alkyl radical at the nitrogen
 atom. The heterocyclyl part of the heterocyclylalkyl radical
 may be optionally substituted as defined above for a het-
 erocyclyl group.

“Heteroaryl” refers to a 5- to 14-membered ring system
 radical comprising hydrogen atoms, one to thirteen carbon
 atoms, one to six heteroatoms selected from the group
 consisting of nitrogen, oxygen and sulfur, and at least one
 aromatic ring. For purposes of this invention, the heteroaryl
 radical may be a monocyclic, bicyclic, tricyclic or tetracy-
 clic ring system, which may include fused or bridged ring
 systems; and the nitrogen, carbon or sulfur atoms in the
 heteroaryl radical may be optionally oxidized; the nitrogen
 atom may be optionally quaternized. Examples include, but
 are not limited to, azepinyl, acridinyl, benzimidazolyl, ben-
 zthiazolyl, benzindolyl, benzodioxolyl, benzofuranyl, ben-
 zoxazolyl, benzothiazolyl, benzothiadiazolyl, benzo[b][1,
 4]dioxepinyl, 1,4-benzodioxanyl, benzonaphthofuranyl,

benzoxazolyl, benzodioxolyl, benzodioxinyl, benzopyranyl, benzopyranonyl, benzofuranyl, benzofuranonyl, benzothienyl (i.e., benzothiophenyl), benzotriazolyl, benzo[4,6]imidazo[1,2-a]pyridinyl, carbazolyl, cinnolinyl, dibenzofuranyl, dibenzothiophenyl, furanyl, furanonyl, isothiazolyl, imidazolyl, indazolyl, indolyl, indazolyl, isoindolyl, indolinyl, isoindolinyl, isoquinolyl, indoliziny, isoxazolyl, naphthyridinyl, oxadiazolyl, 2-oxoazepinyl, oxazolyl, oxiranyl, 1-oxidopyridinyl, 1-oxidopyrimidinyl, 1-oxidopyrazinyl, 1-oxidopyridazinyl, 1-phenyl-1H-pyrrolyl, phenazinyl, phenothiazinyl, phenoxazinyl, phthalazinyl, pteridinyl, purinyl, pyrrolyl, pyrazolyl, pyridinyl, pyrazinyl, pyrimidinyl, pyridazinyl, pyrrolyl, quinazoliny, quinoxalinyl, quinolinyl, quinuclidinyl, isoquinolinyl, tetrahydroquinolinyl, thiazolyl, thiadiazolyl, triazolyl, tetrazolyl, triazinyl, and thiophenyl thienyl). Unless stated otherwise specifically in the specification, the term "optionally substituted heteroaryl" is meant to include heteroaryl radicals as defined above which are optionally substituted by one or more substituents selected from the group consisting of alkyl, alkenyl, alkoxy, halo, haloalkyl, haloalkenyl, cyano, oxo, thioxo, nitro, aryl, aralkyl, cycloalkyl, cycloalkylalkyl, heterocyclyl, heterocyclalkyl, heteroaryl, heteroarylalkyl, $-R^{15}-OR^{14}$, $-R^{15}-OC(O)-R^{14}$, $-R^{15}-N(R^{14})_2$, $-R^{15}-C(O)R^{14}$, $-R^{15}-C(O)OR^{14}$, $-R^{15}-C(O)N(R^{14})_2$, $-R^{15}-N(R^{14})C(O)OR^{16}$, $-R^{15}-N(R^{14})C(O)R^{16}$, $-R^{15}-N(R^{14})S(O)_tR^{16}$ (where t is 1 to 2), $-R^{15}-N=C(OR^{14})R^{14}$, $-R^{15}-S(O)_pOR^{16}$ (where p is 1 to 2), and $-R^{15}-S(O)_tN(R^{14})_2$ (where t is 1 to 2) where each R^{14} is independently hydrogen, alkyl, alkenyl, haloalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl or heteroarylalkyl; each R^{15} is independently a direct bond or a straight or branched alkylene or alkenylene chain; and each R^{16} is alkyl, alkenyl, haloalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl or heteroarylalkyl. These optional substituents, including the R^{14} and R^{16} substituents, may be optionally substituted as defined herein.

"Heteroarylalkyl" refers to a radical of the formula $-R_bR_i$ where R_b is an alkylene chain as defined above and R_i is a heteroaryl radical as defined above. The heteroaryl part of the heteroarylalkyl radical may be optionally substituted as defined above for a heteroaryl group.

As disclosed herein, a composition for substantially stable storage of nucleic acid molecules in a biological sample, may comprise (a) one or more compounds of formula (I); and (b) one, two, or all three of (i) at least one precipitating agent, (ii) at least one lower alcohol, and (iii) at least one chaotrope.

The pharmaceutically acceptable anion may be any anionic complement to the cationic moiety shown in formula (I), including but not limited to halides, C_1 - C_{12} alkylsulfonate, hexafluorophosphate, methylsulfate, ethylsulfate, tetrafluoroborate, trifluoromethanesulfonate, bis(trifluoromethylsulfonyl)imide, nitrate, phosphate, aryl sulfonate, tetrafluoroborate, trifluoromethanesulfonate, hexafluoroantimonate, hexafluoroarsenate, hexafluorophosphate, tetraphenylborate, or tetra(perfluorophenyl)borate, or any other biocompatible anion that does not interfere with substantial recovery of nucleic acid and/or polypeptide molecules from the stored biological sample.

The pharmaceutically acceptable anion or "anionic moiety" thus includes a pharmaceutically acceptable and chemically stable negatively charged species. It is also preferred that the anionic moiety does not exhibit reactivity towards any other agents comprising the composition for stable storage. Additional examples of pharmaceutically accept-

able anionic moieties include, but are not limited to, halogen ions, such as a fluoride ion, chloride ion, bromide ion and iodide ion; anions of inorganic acid salts such as nitrate, perchlorate, sulfate, phosphate, and carbonate; pharmaceutically acceptable anions of lower alkylsulfonic acid salts such as methanesulfonic acid, and ethanesulfonic acid salts; pharmaceutically acceptable anions of arylsulfonic acid salts such as benzenesulfonic acid, 2-naphthalenesulfonic acid and p-toluenesulfonic acid salts; pharmaceutically acceptable anions of organic acid salts such as trichloroacetic acid, trifluoroacetic acid, hydroxyacetic acid, benzoic acid, mandelic acid, butyric acid, propionic acid, formic acid, fumaric acid, succinic acid, citric acid, tartaric acid, oxalic acid, maleic acid, acetic acid, malic acid, lactic acid, and ascorbic acid salts; and pharmaceutically acceptable anions of acidic amino acid salts such as glutamic acid and aspartic acid salts. In the case of certain preferred examples of the compound of formula (I), the halogen anionic moiety precursor may be exchanged for aryl or alkyl sulphonate anionic moieties. Examples include, but are not limited to, benzene sulfonate, p-toluene sulfonate, 2-naphthylene sulfonate, methanesulfonate, ethanesulfonate, and propane-sulfonate. Those skilled in the art will appreciate that these and other suitable anions may be exchanged with the anionic complement that may be provided with the cationic moiety to obtain the compound of formula (I) as provided herein, having any particular desired anionic, through routine methodologies.

Precipitating agent. According to certain embodiments of the herein described composition for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample, a precipitating agent may be included, which refers to compounds that influence the solubility of nucleic acid and/or polypeptide molecules. In some embodiments a precipitating agent is one which has been used in the isolation of nucleic acid molecules, such as an agent that promotes nucleic acid precipitation from biological samples or from extracts of biological samples. Non-limiting examples of precipitating agents include 5-(4-dimethyl) amino benzylidene rhodanine, sulfosalicylic acid, lithium chloride, and lithium hydroxide. Other examples include ammonium sulfate, sodium sulfate, sodium chloride, sodium citrate, dextrans, polyethylene glycol, and salts of polyvalent metal cations such as calcium, magnesium, manganese and iron. Certain embodiments, including but not limited to those presented in Tables 1, 2, 3 and 4, contemplate inclusion of a precipitating agent at a concentration of about 0.05, 0.1, 0.5, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8 or 4.0 M, where "about" may be understood to represent quantitative variation that may be more or less than the recited amount by less than 50%, more preferably less than 40%, more preferably less than 30%, and more preferably less than 20%, 15%, 10% or 5%.

Lower alcohol. As described herein, certain preferred embodiments may include at least one lower alcohol in the composition for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample. Such alcohols include those based on relatively small straight and branched carbon chains, typically of no more than 8, 7, 6, 5, 4 or 3 carbons. Examples, by way of illustration and not limitation, include methanol, ethanol, n-propanol, isopropanol, n-butanol, and isobutanol (2-methylpropan-1-ol), and it will be appreciated that from the present disclosure the skilled person may select other lower alcohols for use in a stable storage composition, as may vary based on the other components of the composition that are employed, the particular biological sample being stored, whether nucleic

acid molecules or polypeptide molecules or both are sought to be recovered, and other factors. Certain embodiments, including but not limited to those presented in Tables 1, 2, 3 and 4, contemplate inclusion of a lower alcohol at a concentration (on a volumetric basis, i.e., vol/vol) of about 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 or 30% (vol/vol), where “about” may be understood to represent quantitative variation that may be more or less than the recited amount by less than 50%, more preferably less than 40%, more preferably less than 30%, and more preferably less than 20%, 15%, 10% or 5%.

Chaotrope. Certain embodiments described herein may include at least one chaotrope in the composition for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample. A number of chaotropes or chaotropic agents are known in the art that disrupt the secondary, tertiary and/or quaternary structures of biological macromolecules such as polypeptides, proteins and nucleic acids, including DNA and RNA. Non-limiting examples of such chaotropes as are contemplated for use in certain of the presently disclosed embodiments include guanidine hydrochloride, guanidine thiocyanate, potassium thiocyanate, sodium thiocyanate and urea. Certain contemplated embodiments, including those that may relate to specific types of biological samples, expressly exclude the presence of a chaotrope when a chelating agent is also present, and in particular of a chaotrope at a concentration sufficient to denature a protein, polypeptide or nucleic acid molecule, while certain other contemplated embodiments are not so limited. Certain embodiments, including but not limited to those presented in Tables 1, 2, 3 and 4, contemplate inclusion of a chaotrope at a concentration of about 0.05, 0.1, 0.5, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.4, 3.4, 3.6, 3.8 or 4.0 M, where “about” may be understood to represent quantitative variation that may be more or less than the recited amount by less than 50%, more preferably less than 40%, more preferably less than 30%, and more preferably less than 20%, 15%, 10% or 5%.

Chelating agents or chelators may, according to certain embodiments, be included in the presently described composition for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample, and are known to those familiar with the art for their ability to complex with and hinder the reactivity of metal cations. Exemplary chelating agents include diethylenetriaminepentaacetic acid (DTPA), ethylenediaminetetraacetic acid (EDTA), ethylene glycol tetraacetic acid (EGTA), trans-1,2-diaminocyclohexane-N,N,N',N'-tetraacetic acid (CDTA), 1,2-bis(2-aminophenoxy)ethane-N,N,N',N'-tetraacetic acid (BAPTA), 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA), N-(2-hydroxyethyl)ethylenediamine-N,N',N'-triacetic acid, and nitrilotriacetic acid (NTA).

Reducing agents may, according to certain embodiments, be included in the presently described composition for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample, and are known to those familiar with the art. Exemplary reducing agents include 2-mercaptoethanol, thiosulfate, TCEP (tris-(2-carboxyethyl) phosphine), dithiothreitol and dithioerythritol.

According to certain embodiments the herein described composition for substantially stable storage of a nucleic acid and/or polypeptide molecule in a biological sample may include one or more pH buffers, which may be any of a large number of compounds known in the art for their ability to resist changes in the pH of a solution, such as an aqueous solution in which the pH buffer is present. Selection of one or more particular pH buffers for inclusion in a stable storage composition may be done based on the present disclosure and according to routine practices in the art, and may be

influenced by a variety of factors including the pH that is desirably to be maintained, the nature of the biological sample, the solvent conditions to be employed, the compound(s) of formula (I) to be used, the solubility properties of the compound(s) of formula (I) and of one or more of the precipitating agent, the lower alcohol and/or the chaotrope, the inclusion of other components, and other criteria. For example, typically a pH buffer is employed at a pH that is within about 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 or 1.0 pH unit of a proton dissociation constant (pK_a) that is a characteristic of the buffer. Non-limiting examples of pH buffers include citric acid, tartaric acid, malic acid, sulfosalicylic acid, sulfoisophthalic acid, oxalic acid, borate, CAPS (3-(cyclohexylamino)-1-propanesulfonic acid), CAPSO (3-(cyclohexylamino)-2-hydroxy-1-propanesulfonic acid), EPPS (4-(2-hydroxyethyl)-1-piperazinepropanesulfonic acid), HEPES (4-(2-hydroxyethyl)piperazine-1-ethanesulfonic acid), MES (2-(N-morpholino)ethanesulfonic acid), MOPS (3-(N-morpholino)propanesulfonic acid), MOPSO (3-morpholino-2-hydroxypropanesulfonic acid), PIPES (1,4-piperazinediethanesulfonic acid), TAPS (N-[tris(hydroxymethyl)methyl]-3-aminopropanesulfonic acid), TAPSO (2-hydroxy-3-[tris(hydroxymethyl)methylamino]-1-propanesulfonic acid), TES (N-[tris(hydroxymethyl)methyl]-2-aminoethanesulfonic acid), bicine (N,N-Bis(2-hydroxyethyl)glycine), tricine (N-[Tris(hydroxymethyl)methyl]glycine), tris (tris(hydroxymethyl)aminomethane) and bis-tris (2-[Bis(2-hydroxyethyl)amino]-2-(hydroxymethyl)-1,3-propanediol). Certain embodiments contemplated herein, including a number of those set forth in Tables 1, 2, 3 and 4, may feature a formulation having a pH of about 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9 or 9.0, where “about” may be understood to represent quantitative variation that may be more or less than the recited pH value by less than 1, preferably less than 0.5, preferably less than 0.25, and more preferably less than 0.1 pH unit.

The herein described composition for substantially stable storage of a nucleic acid and/or polypeptide molecule in a biological sample may, in certain embodiments, contain a surfactant or a detergent which may, in certain embodiments, be selected from Triton® X-100, Nonidet® P40, any of the Brij® family of detergents, any of the Tween® family of surfactants, sodium dodecyl sulfate, sodium lauryl sulfate, deoxycholate, octyl-glucopyranoside, betaines, or the like. Certain contemplated embodiments, including those that may relate to specific types of biological samples, expressly exclude the presence of a denaturing detergent when a chelating agent is also present, and in particular of a detergent of a type and at a concentration sufficient to denature a protein, polypeptide or nucleic acid molecule, while certain other contemplated embodiments are not so limited, where it is to be noted that many detergents and surfactants are non-denaturing for many if not all types of biological samples.

Tables 1, 2, 3 and 4 show exemplary compositions for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample. As described herein and in the Examples, certain preferred embodiments contemplate use of these compositions for blood sample storage, including for recoverable, unrefrigerated storage of DNA, RNA and/or protein from blood samples. Unless otherwise noted herein, formulations are aqueous solutions and “%” refers to weight as a percentage per unit volume (w/v) with the exception of alcohols (e.g., ethanol, 2-mercaptoethanol) for which “%” refers to volume as a percentage per unit volume (v/v).

TABLE 1

| EXEMPLARY COMPOSITIONS FOR STABLE STORAGE OF NUCLEIC ACID AND POLYPEPTIDE MOLECULES IN A BIOLOGICAL SAMPLE | |
|--|---|
| # | Formulation |
| 1.1 | 3.2M guanidine hydrochloride, 100 mM citric acid, 50 mM K ₃ -DTPA, 1 mM 5-(4-dimethyl)amino benzylidene rhodanine pH 4.5. |
| 1.2 | 3.2M guanidine hydrochloride, 10% 1-methyl-3-carboxyethyl-imidazolium bromide, 100 mM citric acid, 50 mM K ₃ -DTPA, 20% ethanol, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine pH 4.5. |
| 1.3 | 3.2M guanidine hydrochloride, 10% 1-methyl-3-carboxyethyl-imidazolium bromide, 100 mM citric acid, 50 mM K ₃ -DTPA, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine pH 4.5. |
| 1.4 | 4M guanidine hydrochloride, 100 mM sulfosalicylic acid, 50 mM Na ₃ -DTPA, 30% ethanol, pH 4.4. |
| 1.5 | 3.5M LiCl, 100 mM citric acid, 15% Brij ®-35, pH 4.4 |
| 1.6 | 3.5M LiCl, 4% 1-hexyl-3-methylimidazolium bromide, 100 mM citric acid, 10% Triton ® X-100, pH 4.4 |
| 1.7 | 3.5M LiCl, 100 mM citric acid, 4% 1-decyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, 30% ethanol, pH 4.4. |
| 1.8 | 3.5M LiCl, 100 mM citric acid, 4% 1-decyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, 30% ethanol, 100 mM TCEP, pH 4.4. |
| 1.9 | 3.5M LiCl, 200 mM citric acid, 4% 1-hexyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, pH 4.4. |
| 1.10 | 3.5M LiCl, 200 mM citric acid, 4% 1-(2-hydroxyethyl)-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, pH 4.4. |

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TABLE 2

| EXEMPLARY COMPOSITIONS FOR STABLE STORAGE OF NUCLEIC ACID AND POLYPEPTIDE MOLECULES IN A BIOLOGICAL SAMPLE | |
|--|---|
| # | Formulation |
| 2.1 | 3.5M LiCl, 200 mM citric Acid, 50 mM Na ₃ -DTPA, 2% 2-mercaptoethanol, 4% 1-decyl-3-methylimidazolium bromide, 30% ethanol, pH 4.6. |
| 2.2 | 3.5M LiCl, 200 mM citric Acid, 50 mM Na ₃ -DTPA, 2% 2-mercaptoethanol, 4% 1-decyl-3-methylimidazolium bromide, pH 4.26. |
| 2.3 | 3.5M LiCl, 200 mM citric Acid, 50 mM Na ₃ -DTPA, 10% 2-mercaptoethanol, 4% 1-decyl-3-methylimidazolium bromide, pH 5.4. |
| 2.4 | 3.5M LiCl, 200 mM citric Acid, 50 mM Na ₃ -DTPA, 10% 2-mercaptoethanol, 4% 1-decyl-3-methylimidazolium bromide, 20% ethanol, pH 5.2. |
| 2.5 | 3.5M LiCl, 200 mM citric Acid, 25 mM Na ₃ -DTPA, 100 mM sodium thiosulfate, 4% 1-decyl-3-methylimidazolium bromide, 30% ethanol, pH 5.0. |
| 2.6 | 3.5M LiCl, 200 mM sulfosalicylic acid, 25 mM Na ₃ -DTPA, 4% 1-decyl-3-methylimidazolium bromide, 10% ethanol, 20% 2-mercaptoethanol, pH 5.2. |

TABLE 3

| EXEMPLARY COMPOSITIONS FOR STABLE STORAGE OF NUCLEIC ACID AND POLYPEPTIDE MOLECULES IN A BIOLOGICAL SAMPLE | |
|--|---|
| # | Formulation |
| 3.1 | 3.5M LiCl, 4% 1-hexyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, pH 7.8. |
| 3.2 | 1M guanidine hydrochloride, 1% 1-hexyl-3-methylimidazolium bromide, 200 mM oxalic acid, 200 mM tartaric acid, 50 mM Na ₃ -DTPA, 0.8M LiOH, pH 8.1. |
| 3.3 | 4M guanidine hydrochloride, 1% 1-hexyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 25 mM Na ₃ -DTPA, pH 4.3. |
| 3.4 | 4% 1-decyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 50 mM citric acid, 2.4M guanidine hydrochloride 10% 2-mercaptoethanol, pH to 4.0 w/ 3M LiOH. |
| 3.5 | 3.5M LiCl, 200 mM Citric acid, 100 mM sulfosalicylic acid, 50 mM Na ₃ -DTPA, 4% 1-decyl-3-methylimidazolium bromide, 10% 2-mercaptoethanol, pH'd to 4.4 with LiOH. |
| 3.6 | 3.5M LiCl, 200 mM citric acid, 50 mM Na ₃ -DTPA, 4% 1-decyl-3-methylimidazolium bromide, 10% 2-mercaptoethanol, pH'd to 4.25 with LiOH. |
| 3.7 | 4M guanidine hydrochloride, 200 mM citric acid, 100 mM sulfosalicylic acid, 4% 1-decyl-3-methylimidazolium bromide, 50 mM Na ₃ -DTPA, 10% 2-mercaptoethanol, pH 4.0. |
| 3.8 | 3.5M LiCl, 200 mM EPPS, 4% 1-octyl-3-methylimidazolium bromide, 30% ethanol, 25 mM TCEP hydrochloride, pH 8.6. |

TABLE 3-continued

| EXEMPLARY COMPOSITIONS FOR STABLE STORAGE OF NUCLEIC ACID AND POLYPEPTIDE MOLECULES IN A BIOLOGICAL SAMPLE | |
|--|--|
| # | Formulation |
| 3.9 | 3.2M guanidine hydrochloride, 10% 1-methyl-3-carboxyethyl-imidazolium bromide, 100 mM citric acid, 50 mM K ₃ -DTPA, 20% ethanol, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine pH 4.5. |
| 3.10 | 3.2M guanidine hydrochloride, 10% 1-methyl-3-carboxyethyl-imidazolium bromide, 100 mM citric acid, 50 mM K ₃ -DTPA, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine pH 4.5. |
| 3.11 | 3.5M LiCl, 4% 1-hexyl-3-methylimidazolium bromide, 100 mM citric acid, 10% Triton X-100, pH 4.4 |
| 3.12 | 3.5M LiCl, 100 mM citric acid, 4% 1-decyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, 30% ethanol, pH 4.4 |
| 3.13 | 3.5M LiCl, 100 mM citric acid, 4% 1-decyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, 30% ethanol, 100 mM TCEP, pH 4.4 |
| 3.14 | 3.5M LiCl, 200 mM citric acid, 4% 1-Hexyl-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, pH 4.4. |
| 3.15 | 3.5M LiCl, 200 mM citric acid, 4% 1-(2-hydroxyethyl)-3-methylimidazolium bromide, 25 mM Na ₃ -DTPA, pH 4.4. |
| 3.16 | 2% 1-decyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 50 mM citric acid, 2.4M guanidine hydrochloride 10% 2-mercaptoethanol, pH to 4.0 w/ 3M LiOH. |
| 3.17 | 1% 1-decyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 50 mM citric acid, 2.4M guanidine hydrochloride, 10% 2-mercaptoethanol, pH to 4.0 w/ 3M LiOH. |
| 3.18 | 0.5% 1-decyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 50 mM citric acid, 2.4M guanidine hydrochloride, 10% 2-mercaptoethanol, pH to 4.0 w/ 3M LiOH. |
| 3.19 | 4% 1-dodecyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 200 mM citric acid, 1% 2-mercaptoethanol, pH 4.0 |
| 3.20 | 1% 1-decyl-3-methylimidazolium bromide, 4M guanidine-HCl, 200 mM MES, 40 mM sulfosalicylic acid, 20 mM TCEP-HCl, pH 3.8 |
| 3.21 | 2% 1-benzyl-3-hexylimidazolium bromide, 4M guanidine hydrochloride, 40 mM sulfosalicylic acid, 20 mM TCEP hydrochloride, 200 mM MES, pH 3.8 |
| 3.22 | 4% 1-decyl-3-methylimidazolium bromide, 200 mM sulfosalicylic acid, 50 mM citric acid, 2.4M guanidine hydrochloride, 50 mM tris-(2-carboxyethyl) phosphine (TCEP) hydrochloride, +1 μL/mL polydimethylsiloxane (Antifoam A®, Spectrum Chemical Mfg. Co. Gardena, CA), pH 3.8 |
| 3.23 | 2% 1-octyl-2,3-dimethylimidazolium bromide, 4M guanidine hydrochloride, 40 mM sulfosalicylic acid, 20 mM TCEP hydrochloride, 200 mM MES, pH 3.8 |
| 3.24 | 2% 1-decyl-3-methylimidazolium bromide, 4M guanidine hydrochloride, 40 mM sulfosalicylic acid, 20 mM TCEP hydrochloride, 200 mM MES, pH 3.8 |
| 3.25 | 2% 1-dodecyl-3-methylimidazolium bromide, 4M guanidine hydrochloride, 40 mM sulfosalicylic acid, 20 mM TCEP hydrochloride, 200 mM MES, pH 3.8 |
| 3.26 | 1M guanidine hydrochloride, 10% 1-methyl-3-carboxyethylimidazolium bromide, 100 mM sulfosalicylic acid, 10 mM Na ₃ -DTPA, 30% ethanol, 0.5 mM Yellow #5, 0.2 mM Rifamycin SV, pH 4.6 |
| 3.27 | 1M guanidine hydrochloride, 10% 1-methyl-3-carboxyethylimidazolium bromide, 100 mM sulfosalicylic acid, 10 mM Na ₃ -DTPA, 0.5 mM Yellow #5, 0.2 mM Rifamycin SV, pH 4.5. |
| 3.28 | 10% 1-methyl-3-carboxyethyl imidazole, 1% SDS, 200 mM citric acid, 100 mM boric acid, 0.1M LiOH, 30% ethanol, pH 4.5 |
| 3.29 | 10% 1-methyl-3-carboxyethyl imidazole, 100 mM citric acid, 50 mM K ₃ -DTPA, 30% ethanol, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine, pH 4.5. |
| 3.30 | 5% 1-methyl-3-carboxyethyl imidazole, 100 mM sulfosalicylic acid, 100 mM citric acid, 50 mM K ₃ -DTPA, 30% ethanol, 0.2 mM Rifamycin SV, pH 4.5. |
| 3.31 | 3.2M guanidine hydrochloride, 10% 1-methyl-3-carboxyethyl-imidazolium bromide, 100 mM citric acid, 50 mM K ₃ -DTPA, 20% ethanol, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine, pH 4.5. |
| 3.32 | 3.2M guanidine hydrochloride, 10% 1-methyl-3-carboxyethyl-imidazolium bromide, 100 mM citric acid, 50 mM K ₃ -DTPA, 1 mM 5-(4-dimethyl)aminobenzylidene rhodanine, pH 4.5. |

TABLE 4

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|---|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (C) + (D) | (A) + (C) + (D) |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine HCl | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|--|---|--|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-hexyl-3-methylimidazolium bromide | sulfosalicylic acid | methanol | guanidine hydrochloride | sulfosalicylic acid + methanol | sulfosalicylic acid + guanidine HCl | methanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | methanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | methanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-decyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + methanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + methanol | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | methanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + lithium chloride + methanol | 1-hexyl-3-methylimidazolium bromide + lithium chloride + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | methanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + lithium chloride + methanol | 1-decyl-3-methylimidazolium bromide + lithium chloride + guanidine HCl | 1-decyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | lithium chloride | methanol | guanidine hydrochloride | Lithium chloride + methanol | methanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + Lithium chloride + methanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + Lithium hydroxide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + methanol + Lithium hydroxide + methanol | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + Lithium hydroxide + methanol | 1-decyl-3-methylimidazolium bromide + methanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + Lithium hydroxide + methanol | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + ethanol | 1-hexyl-3-methylimidazolium bromide + ethanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | rhodamine | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | rhodamine + ethanol | rhodamine + guanidine HCl | rhodamine + ethanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + ethanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|---|--|--|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium hydroxide | bromide + ethanol | bromide + LiOH + ethanol | bromide + LiOH + guanidine HCl | bromide + ethanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + LiOH + ethanol | 1-decyl-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + n-rhodanine + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + n-propanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + n-propanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-propanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + sulfosalicylic acid | bromide + Isopropanol | bromide + guanidine hydrochloride | bromide + sulfosalicylic acid + isopropanol | bromide + sulfosalicylic acid + guanidine HCl | bromide + sulfosalicylic acid + isopropanol + guanidine HCl | bromide + isopropanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + isopropanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isopropanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiCl + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-decyl-3-methylimidazolium bromide + LiCl + guanidine HCl | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isopropanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium chloride | bromide + isopropanol | bromide + LiCl + isopropanol | bromide + LiCl + guanidine HCl | bromide + isopropanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + isopropanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + isopropanol | 1-decyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-decyl-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-decyl-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + isopropanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-butanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino | 1-hexyl-3-methylimidazolium bromide + n-butanol + |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + n-butanol | hydrochloride | benzylidene rhodanine + n-butanol | benzylidene rhodanine + guanidine HCl | benzylidene rhodanine + n-butanol + guanidine HCl | guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + guanidine HCl | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine hydrochloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + guanidine hydrochloride | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + n-butanol + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + n-butanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine hydrochloride | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sulfosalicylic acid + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sulfosalicylic acid + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + n-butanol + sulfosalicylic acid + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + n-butanol + sulfosalicylic acid + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + guanidine hydrochloride | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine HCl | 1-decyl-3-methylimidazolium bromide + n-butanol + sulfosalicylic acid + guanidine HCl | 1-decyl-3-methylimidazolium bromide + n-butanol + sulfosalicylic acid + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|---|--|--|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium hydroxide | bromide + n-butanol | bromide + LiOH + n-butanol | bromide + LiOH + guanidine HCl | bromide + n-butanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + LiOH + n-butanol | 1-decyl-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine HCl |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + guanidine HCl | 1-benzyl-3-hexylimidazolium bromide + n-butanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol + guanidine HCl | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + guanidine HCl |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol + guanidine HCl | 1-hexyl-3-methylimidazolium bromide + isobutanol + guanidine HCl |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol + guanidine HCl | 1-decyl-3-methylimidazolium bromide + isobutanol + guanidine HCl |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isobutanol + guanidine HCl | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + guanidine HCl |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|---|--|---|--|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium hydroxide | bromide + isobutanol | bromide + guanidine hydrochloride | bromide + LiOH + isobutanol | bromide + LiOH + guanidine HCl | bromide + LiOH + isobutanol + guanidine HCl | bromide + isobutanol + guanidine HCl |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | |
| (A) | | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (C) + (D) | |
| | rhodamine | rhodamine + methanol | rhodamine + guanidine thiocyanate | rhodamine + methanol + guanidine thiocyanate | thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + methanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + methanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + methanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + methanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + methanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + methanol | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|--|---|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + Lithium chloride + methanol | 1-hexyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + Lithium chloride + methanol | 1-decyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Lithium chloride + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + Lithium chloride + methanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + Lithium hydroxide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + Lithium hydroxide + methanol | 1-hexyl-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + Lithium hydroxide + methanol | 1-decyl-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Lithium hydroxide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|--|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) | |
| 1-benzyl-3-hexylimidazolium bromide | lithium hydroxide | methanol | guanidine thiocyanate | Lithium hydroxide + methanol | guanidine thiocyanate | methanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide + methanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + methanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + ethanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + ethanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodanine + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|--|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + ethanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + ethanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + ethanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| imidazolium bromide | imidazolium bromide + lithium chloride | imidazolium bromide + ethanol | imidazolium bromide + guanidine thiocyanate | imidazolium bromide + LiCl + ethanol + guanidine thiocyanate | imidazolium bromide + ethanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + ethanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + ethanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + ethanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + ethanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + ethanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + ethanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + ethanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|---|--|--|--|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + ethanol | thiocyanate | guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + n-propanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|---|--|--|---|---|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) | |
| | benzylidene rhodanine | | thiocyanate | benzylidene rhodanine + n- propanol | benzylidene rhodanine + n- propanol + guanidine thiocyanate | guanidine thiocyanate |
| 1-benzyl-3- hexylimidazolium bromide | 1-benzyl-3- hexylimidazolium bromide + 5-(4- dimethyl)amino benzylidene rhodanine | 1-benzyl-3- hexylimidazolium bromide + n- propanol | 1-benzyl-3- hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3- hexylimidazolium bromide + 5-(4- dimethyl)amino benzylidene rhodanine + n- propanol | 1-benzyl-3- hexylimidazolium bromide + 5-(4- dimethyl)amino benzylidene rhodanine + n- propanol + guanidine thiocyanate | 1-benzyl-3- hexylimidazolium bromide + n- propanol + guanidine thiocyanate |
| 1-methyl-3- carboxyethyl- imidazolium bromide | 1-methyl-3- carboxyethyl- imidazolium bromide + sulfosalicylic acid | 1-methyl-3- carboxyethyl- imidazolium bromide + n- propanol | 1-methyl-3- carboxyethyl- imidazolium bromide + guanidine thiocyanate | 1-methyl-3- carboxyethyl- imidazolium bromide + sulfosalicylic acid + n-propanol | 1-methyl-3- carboxyethyl- imidazolium bromide + sulfosalicylic acid + n-propanol + guanidine thiocyanate | 1-methyl-3- carboxyethyl- imidazolium bromide + n- propanol + guanidine thiocyanate |
| 1-hexyl-3- methylimidazolium bromide | 1-hexyl-3- methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3- methylimidazolium bromide + n- propanol | 1-hexyl-3- methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3- methylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-hexyl-3- methylimidazolium bromide + sulfosalicylic acid + n-propanol + guanidine thiocyanate | 1-hexyl-3- methylimidazolium bromide + n- propanol + guanidine thiocyanate |
| 1-decyl-3- methylimidazolium bromide | 1-decyl-3- methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3- methylimidazolium bromide + n- propanol | 1-decyl-3- methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3- methylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-decyl-3- methylimidazolium bromide + sulfosalicylic acid + n-propanol + guanidine thiocyanate | 1-decyl-3- methylimidazolium bromide + n- propanol + guanidine thiocyanate |
| 1-(2- hydroxyethyl)-3- methylimidazolium bromide | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + sulfosalicylic acid | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + n- propanol | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + guanidine thiocyanate | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + sulfosalicylic acid + n-propanol + guanidine thiocyanate | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + n- propanol + guanidine thiocyanate |
| 1-benzyl-3- hexylimidazolium bromide | 1-benzyl-3- hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3- hexylimidazolium bromide + n- propanol | 1-benzyl-3- hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3- hexylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-benzyl-3- hexylimidazolium bromide + sulfosalicylic acid + n-propanol + guanidine thiocyanate | 1-benzyl-3- hexylimidazolium bromide + n- propanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|---|---|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|---|---|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-decyl-3-methylimidazolium bromide + LiOH + n-propanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-propanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-propanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + isopropanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + isopropanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + isopropanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|--|--|---|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + Isopropanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + Isopropanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|---|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| | hydroxide | Isopropanol | guanidine thiocyanate | isopropanol | isopropanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-hexyl-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-decyl-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isopropanol | 1-benzyl-3-hexylimidazolium bromide + isopropanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-butanol | 1-hexyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|--|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-butanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-butanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + n-butanol | 1-hexyl-3-methylimidazolium bromide + LiCl + n-butanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + n-butanol | 1-decyl-3-methylimidazolium bromide + LiCl + n-butanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-butanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-butanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|--|--|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-methyl-3-carboxyethylimidazolium bromide | chloride | butanol | guanidine thiocyanate | n-butanol + guanidine thiocyanate | butanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + n-butanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + n-butanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + n-butanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-butanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + isobutanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + n-butanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|---|---|--|--|---|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | dimethylamino benzylidene rhodanine | isobutanol | guanidine thiocyanate | dimethylamino benzylidene rhodanine + isobutanol | dimethylamino benzylidene rhodanine + guanidine thiocyanate | dimethylamino benzylidene rhodanine + isobutanol + guanidine thiocyanate | isobutanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + guanidine | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + sulfosalicylic acid + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|--|---|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isobutanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + isobutanol | 1-hexyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + isobutanol | 1-decyl-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|---|--|---|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | lithium chloride | isobutanol | guanidine thiocyanate | isobutanol + guanidine thiocyanate | isobutanol + guanidine thiocyanate | isobutanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + isobutanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isobutanol + guanidine thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isobutanol + guanidine thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isobutanol + guanidine thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isobutanol + guanidine thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + guanidine thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) | |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | potassium thiocyanate | methanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + methanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + methanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|--|---|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + potassium methanol thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + potassium methanol thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + potassium methanol thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + methanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + potassium methanol thiocyanate | 1-benzyl-3-hexylimidazolium bromide + methanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + methanol | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + potassium methanol thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + methanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + thiocyanate | 1-hexyl-3-methylimidazolium bromide + lithium chloride + methanol | 1-hexyl-3-methylimidazolium bromide + lithium chloride + potassium methanol thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + thiocyanate | 1-decyl-3-methylimidazolium bromide + lithium chloride + methanol | 1-decyl-3-methylimidazolium bromide + lithium chloride + potassium methanol thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + 5-(4-dimethyl)amino benzylidene rhodamine | bromide + ethanol | bromide + potassium thiocyanate | bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol | bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | bromide + ethanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + ethanol + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | |
|--|--|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) |
| bromide | bromide + lithium chloride | bromide + ethanol | bromide + LiCl + ethanol | bromide + LiCl + ethanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + ethanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + ethanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + ethanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + LiOH + ethanol | 1-hexyl-3-methylimidazolium bromide + LiOH + ethanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + LiOH + ethanol | 1-decyl-3-methylimidazolium bromide + LiOH + ethanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + ethanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + ethanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|---|--|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| | hydroxide | | potassium thiocyanate | ethanol | potassium thiocyanate | ethanol + potassium thiocyanate | ethanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + n-propanol + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium chloride | bromide + n-propanol | bromide + LiCl + n-propanol | bromide + LiCl + n-propanol + potassium thiocyanate | bromide + n-propanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + LiCl + n-propanol | 1-decyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-decyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | lithium hydroxide | propanol | potassium thiocyanate | n-propanol + potassium thiocyanate | propanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-propanol + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|--|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isopropanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + isopropanol + thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol + thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol + thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol + thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|--|--|---|---|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| imidazolium bromide | imidazolium bromide + lithium chloride | imidazolium bromide + Isopropanol | imidazolium bromide + potassium thiocyanate | imidazolium bromide + LiCl + isopropanol | imidazolium bromide + LiCl + potassium thiocyanate | imidazolium bromide + isopropanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-decyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-decyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isopropanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isopropanol + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|--|--|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| | benzylidene rhodanine | | thiocyanate | benzylidene rhodanine + n-butanol | benzylidene rhodanine + n-butanol + thiocyanate | potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-butanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + n-butanol + thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-butanol + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|--|--|---|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + n-butanol | 1-hexyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + n-butanol | 1-decyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + n-butanol | 1-hexyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + LiOH + n-butanol | 1-decyl-3-methylimidazolium bromide + LiOH + n-butanol + thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-butanol + thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-butanol + thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|--|---|--|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + isobutanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|---|---|--|--|---|-----------------------|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + potassium thiocyanate | potassium thiocyanate | thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + potassium thiocyanate | potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + isobutanol | 1-hexyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + isobutanol | 1-decyl-3-methylimidazolium bromide + LiCl + potassium thiocyanate | potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + potassium thiocyanate | potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + isobutanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + potassium thiocyanate | potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + potassium thiocyanate | potassium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + potassium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|--|---|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isobutanol | 1-hexyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + isobutanol | 1-decyl-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + potassium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isobutanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + potassium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + potassium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + methanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + methanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + dimethylamino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + methanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + methanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + methanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + methanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|--|---|---|--|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + sulfosalicylic acid | bromide + ethanol | bromide + sodium thiocyanate | bromide + sulfosalicylic acid + ethanol | bromide + sulfosalicylic acid + sodium thiocyanate | bromide + ethanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + ethanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + ethanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + ethanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + ethanol | 1-hexyl-3-methylimidazolium bromide + LiCl + ethanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + ethanol | 1-decyl-3-methylimidazolium bromide + LiCl + ethanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + ethanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + ethanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + ethanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + LiOH + ethanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + ethanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + ethanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + ethanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|---|---|---|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + sulfosalicylic acid | bromide + n-propanol | bromide + sodium thiocyanate | bromide + sulfosalicylic acid + sodium thiocyanate | bromide + n-propanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-propanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-propanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + n-propanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + n-propanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-propanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-propanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-propanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|---|---|---|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) | |
| | hydroxide | propanol | thiocyanate | n-propanol | sodium thiocyanate | n-propanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-decyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-propanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|---|--|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isopropanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + Isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isopropanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + Isopropanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + Isopropanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + isopropanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + Isopropanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + isopropanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|---|---|--|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + isopropanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + isopropanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + isopropanol | 1-decyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + isopropanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isopropanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isopropanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + n-rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + n-butanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + isopropanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + n-butanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + n-butanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|--|---|--|---|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| | rhodanine | | | rhodanine + n-butanol | rhodanine + sodium thiocyanate | rhodanine + n-butanol + sodium thiocyanate | |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodanine + n-butanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiCl + n-butanol | 1-hexyl-3-methylimidazolium bromide + LiCl + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiCl + n-butanol | 1-decyl-3-methylimidazolium bromide + LiCl + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|--|---|---|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| | chloride | butanol | thiocyanate | n-butanol | sodium thiocyanate | n-butanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + n-butanol | 1-hexyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + LiOH + n-butanol | 1-decyl-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + n-butanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + n-butanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene) rhodamine + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + n-butanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|---|---|---|--|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| (A) | | | | | | | |
| 1-decyl-3-methylimidazolium bromide | dimethylamino benzylidene rhodanine | isobutanol | sodium thiocyanate | dimethylamino benzylidene rhodanine + isobutanol | dimethylamino benzylidene rhodanine + sodium thiocyanate | dimethylamino benzylidene rhodanine + isobutanol + sodium thiocyanate | isobutanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodanine + isobutanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + sodium | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|---|--|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isobutanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isobutanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride + isobutanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + lithium chloride + isobutanol | 1-hexyl-3-methylimidazolium bromide + lithium chloride + isobutanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + isobutanol | 1-decyl-3-methylimidazolium bromide + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + lithium chloride + isobutanol | 1-decyl-3-methylimidazolium bromide + lithium chloride + isobutanol + sodium thiocyanate | 1-decyl-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride + isobutanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|---|---|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | lithium chloride | isobutanol | sodium thiocyanate | sodium thiocyanate | isobutanol + sodium thiocyanate | isobutanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiCl + isobutanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-hexyl-3-methylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-decyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + isobutanol | 1-hexyl-3-methylimidazolium bromide + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-hexyl-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + isobutanol | 1-benzyl-3-hexylimidazolium bromide + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-benzyl-3-hexylimidazolium bromide + isobutanol + sodium thiocyanate |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + isobutanol + sodium thiocyanate | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + sodium thiocyanate |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | | |
|--|--|---|---|---|--|---|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (D) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-hexyl-3-methylimidazolium bromide | dimethyl)amino benzylidene rhodamine | methanol | 1-hexyl-3-methylimidazolium bromide + urea | dimethyl)amino benzylidene rhodamine + methanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | dimethyl)amino benzylidene rhodamine + urea | 1-hexyl-3-methylimidazolium bromide + methanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + urea | 1-decyl-3-methylimidazolium bromide + methanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + methanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + urea | 1-benzyl-3-hexylimidazolium bromide + methanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + methanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + methanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + urea | 1-methyl-3-carboxyethylimidazolium bromide + methanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + methanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + urea | 1-hexyl-3-methylimidazolium bromide + methanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + methanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + urea | 1-decyl-3-methylimidazolium bromide + methanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|---|---|---|---|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium hydroxide | bromide + methanol | bromide + urea | bromide + Lithium hydroxide + methanol | bromide + LiOH + methanol + urea | bromide + methanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + methanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + Lithium hydroxide + methanol | 1-decyl-3-methylimidazolium bromide + LiOH + methanol + urea | 1-decyl-3-methylimidazolium bromide + methanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + Lithium hydroxide + methanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + methanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + methanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + methanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + Lithium hydroxide + methanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + methanol + urea | 1-benzyl-3-hexylimidazolium bromide + methanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol + urea | 1-hexyl-3-methylimidazolium bromide + ethanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol + urea | 1-decyl-3-methylimidazolium bromide + ethanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino benzylidene rhodamine + ethanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|---|--|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + lithium chloride | bromide + ethanol | bromide + urea | bromide + LiCl + urea | bromide + ethanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + LiCl + urea | 1-benzyl-3-hexylimidazolium bromide + ethanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + ethanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + urea | 1-methyl-3-carboxyethylimidazolium bromide + ethanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + ethanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + LiOH + urea | 1-hexyl-3-methylimidazolium bromide + ethanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + ethanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + LiOH + urea | 1-decyl-3-methylimidazolium bromide + ethanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + ethanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + ethanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + LiOH + urea | 1-benzyl-3-hexylimidazolium bromide + ethanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodamine + urea | 1-hexyl-3-methylimidazolium bromide + n-propanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + urea | 1-decyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-propanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + urea | 1-benzyl-3-hexylimidazolium bromide + n-propanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + urea | 1-hexyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + urea | 1-decyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|--|---|--|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-propanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + n-propanol + urea | 1-benzyl-3-hexylimidazolium bromide + n-propanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + LiCl + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiCl + urea | 1-hexyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + LiCl + n-propanol | 1-decyl-3-methylimidazolium bromide + LiCl + urea | 1-decyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + LiCl + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiCl + urea | 1-benzyl-3-hexylimidazolium bromide + n-propanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + n-propanol | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-propanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-propanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-hexyl-3-methylimidazolium bromide + LiOH + urea | 1-hexyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium hydroxide | 1-decyl-3-methylimidazolium bromide + n-propanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + LiOH + n-propanol | 1-decyl-3-methylimidazolium bromide + LiOH + urea | 1-decyl-3-methylimidazolium bromide + n-propanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + n-propanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-propanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|---|--|---|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| | lithium hydroxide | propanol | n-propanol | urea | n-propanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-propanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + urea | 1-benzyl-3-hexylimidazolium bromide + n-propanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol + urea | 1-hexyl-3-methylimidazolium bromide + isopropanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol + urea | 1-decyl-3-methylimidazolium bromide + isopropanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isopropanol + urea | 1-benzyl-3-hexylimidazolium bromide + isopropanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|---|--|---|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isopropanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + urea | 1-hexyl-3-methylimidazolium bromide + isopropanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + urea | 1-decyl-3-methylimidazolium bromide + isopropanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + isopropanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isopropanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + isopropanol + urea | 1-benzyl-3-hexylimidazolium bromide + isopropanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isopropanol | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + isopropanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + isopropanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-hexyl-3-methylimidazolium bromide + LiCl + isopropanol + urea | 1-hexyl-3-methylimidazolium bromide + isopropanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol | 1-decyl-3-methylimidazolium bromide + LiCl + isopropanol + urea | 1-decyl-3-methylimidazolium bromide + isopropanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|---|--|--|--|---|
| Compound of Formula (I) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| bromide | bromide + 5-(4-dimethylamino)benzylidene rhodanine | bromide + n-butanol | bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-butanol | bromide + 5-(4-dimethylamino)benzylidene rhodanine + urea | bromide + n-butanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-butanol + urea | 1-decyl-3-methylimidazolium bromide + n-butanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-butanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethylamino)benzylidene rhodanine + n-butanol + urea | 1-benzyl-3-hexylimidazolium bromide + n-butanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + n-butanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + urea | 1-hexyl-3-methylimidazolium bromide + n-butanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + urea | 1-decyl-3-methylimidazolium bromide + n-butanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + sulfosalicylic acid + n-butanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | |
|--|--|--|---|--|---|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | sulfosalicylic acid | butanol | 1-benzyl-3-hexylimidazolium bromide + urea | sulfosalicylic acid + urea | butanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + sulfosalicylic acid + urea | 1-benzyl-3-hexylimidazolium bromide + n-butanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium chloride | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + LiCl + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium chloride | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + LiCl + urea | 1-hexyl-3-methylimidazolium bromide + n-butanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + lithium chloride | 1-decyl-3-methylimidazolium bromide + n-butanol | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + LiCl + urea | 1-decyl-3-methylimidazolium bromide + n-butanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium chloride | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiCl + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium chloride | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + LiCl + urea | 1-benzyl-3-hexylimidazolium bromide + n-butanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + lithium hydroxide | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + LiOH + urea | 1-methyl-3-carboxyethylimidazolium bromide + n-butanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + lithium hydroxide | 1-hexyl-3-methylimidazolium bromide + n-butanol | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + LiOH + urea | 1-hexyl-3-methylimidazolium bromide + n-butanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + lithium hydroxide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + LiOH + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + n-butanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|--|--|---|---|---|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3-hexylimidazolium bromide + n-butanol | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-butanol | 1-benzyl-3-hexylimidazolium bromide + LiOH + n-butanol + urea | 1-benzyl-3-hexylimidazolium bromide + n-butanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + urea |
| 1-hexyl-3-methylimidazolium bromide | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + urea | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol | 1-hexyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol + urea | 1-hexyl-3-methylimidazolium bromide + isobutanol + urea |
| 1-decyl-3-methylimidazolium bromide | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + urea | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol | 1-decyl-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol + urea | 1-decyl-3-methylimidazolium bromide + isobutanol + urea |
| 1-(2-hydroxyethyl)-3-methylimidazolium bromide | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol + urea | 1-(2-hydroxyethyl)-3-methylimidazolium bromide + isobutanol + urea |
| 1-benzyl-3-hexylimidazolium bromide | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + urea | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol | 1-benzyl-3-hexylimidazolium bromide + 5-(4-dimethyl)amino benzylidene rhodamine + isobutanol + urea | 1-benzyl-3-hexylimidazolium bromide + isobutanol + urea |
| 1-methyl-3-carboxyethylimidazolium bromide | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + urea | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol | 1-methyl-3-carboxyethylimidazolium bromide + sulfosalicylic acid + isobutanol + urea | 1-methyl-3-carboxyethylimidazolium bromide + isobutanol + urea |

TABLE 4-continued

| EXEMPLARY STORAGE COMPOSITIONS | | | | | | |
|---|--|---|--|--|--|--|
| (A) | (A) + (B) Precipitating Agent | (A) + (C) Lower Alcohol | (A) + (D) Chaotrope | (A) + (B) + (C) | (A) + (B) + (C) + (D) | (A) + (C) + (D) |
| carboxyethyl- imidazolium bromide | carboxyethyl- imidazolium bromide + lithium hydroxide | carboxyethyl- imidazolium bromide + isobutanol | carboxyethyl- imidazolium bromide + urea | carboxyethyl- imidazolium bromide + LiOH + isobutanol | carboxyethyl- imidazolium bromide + LiOH + urea | carboxyethyl- imidazolium bromide + isobutanol + urea |
| 1-hexyl-3- methylimidazolium bromide | 1-hexyl-3- methylimidazolium bromide + lithium hydroxide | 1-hexyl-3- methylimidazolium bromide + isobutanol | 1-hexyl-3- methylimidazolium bromide + urea | 1-hexyl-3- methylimidazolium bromide + LiOH + isobutanol | 1-hexyl-3- methylimidazolium bromide + LiOH + urea | 1-hexyl-3- methylimidazolium bromide + isobutanol + urea |
| 1-decyl-3- methylimidazolium bromide | 1-decyl-3- methylimidazolium bromide + lithium hydroxide | 1-decyl-3- methylimidazolium bromide + isobutanol | 1-decyl-3- methylimidazolium bromide + urea | 1-decyl-3- methylimidazolium bromide + LiOH + isobutanol | 1-decyl-3- methylimidazolium bromide + LiOH + urea | 1-decyl-3- methylimidazolium bromide + isobutanol + urea |
| 1-(2- hydroxyethyl)-3- methylimidazolium bromide | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + lithium hydroxide | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + isobutanol | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + urea | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + LiOH + isobutanol | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + LiOH + urea | 1-(2- hydroxyethyl)-3- methylimidazolium bromide + isobutanol + urea |
| 1-benzyl-3- hexylimidazolium bromide | 1-benzyl-3- hexylimidazolium bromide + lithium hydroxide | 1-benzyl-3- hexylimidazolium bromide + isobutanol | 1-benzyl-3- hexylimidazolium bromide + urea | 1-benzyl-3- hexylimidazolium bromide + LiOH + isobutanol | 1-benzyl-3- hexylimidazolium bromide + LiOH + urea | 1-benzyl-3- hexylimidazolium bromide + isobutanol + urea |

The compositions of Tables 1, 2, 3 and 4 and other invention embodiments as described herein may be used for storage of liquid or non-liquid samples and for storage at ambient temperature, and also may have use for the storage of diverse biological materials and biological samples, such as but not limited to DNA, RNA, proteins and polypeptides, blood, buffy coat fraction of blood, peripheral blood mononuclear cells (PBMC) or isolated subsets thereof, other cells of hematopoietic origin such as lymphoid, myeloid, erythroid precursor, bone marrow stromal or other hematopoietic cells, urine, other biological fluids (e.g., serum, serosal fluids, plasma, lymph, cerebrospinal fluid, saliva, mucosal secretions of the secretory tissues and organs, vaginal secretions, ascites fluids, fluids of the pleural, pericardial, peritoneal, abdominal and other body cavities, cell and organ culture medium including cell or organ conditioned medium, lavage fluids and the like, etc.) buccal swabs, bacteria, viruses, engineered viral vectors, yeast cells, vaccines (e.g., natural or synthetic, live or attenuated in the case of intact biological particles such as viral or other microbial vaccines, or extracts of natural, synthetic or artificial materials including products of genetic engineering), cells and tissues, sorted or selected cells, cell or tissue lysates, cell or tissue homogenates or extracts, and the like, or other biological samples.

Certain preferred embodiments of the compositions and methods disclosed herein relate to substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample that comprises blood, preferably from a vertebrate, more preferably from a mammal, more preferably from a primate and still more preferably from a human. The blood may be whole, e.g., unfractionated, or may be blood that has undergone some processing to remove one or more components, for example, the isolated buffy coat fraction of blood which is enriched for white blood cells, or blood from which platelets and/or erythrocytes and/or plasma or serum have been partially or substantially depleted. Also contemplated is blood that, at the time of or shortly after collection from a subject or biological source (e.g., a human donor or patient or other subject), may have been treated with an anticoagulant or preservative or the like (e.g., heparin, citrate, EDTA, etc.) which, it will be appreciated, is a common practice in the biomedical art.

Biological samples may therefore also include a blood sample, biopsy specimen, tissue explant, organ culture, biological fluid or any other tissue or cell preparation, or fraction or derivative thereof or isolated therefrom, from a subject or a biological source. The subject or biological source may be a human or non-human animal, including mammals and non-mammals, vertebrates and invertebrates, and may also be any other multicellular organism or single-celled organism such as a eukaryotic (including plants and algae) or prokaryotic organism or archaeon, microorganisms (e.g., bacteria, archaea, fungi, protists, viruses), aquatic plankton, soil, biofilms, microbial mats or clusters, a primary cell culture or culture adapted cell line including but not limited to genetically engineered cell lines that may contain chromosomally integrated or episomal recombinant nucleic acid sequences or artificial chromosomes, immortalized or immortalizable cell lines, somatic cell hybrid cell lines, differentiated or differentiable cell lines, stem cells, germ cells (e.g., sperm, oocytes), transformed cell lines and the like.

The presently used terms “biological sample”, “biological molecule” and “biomolecule” encompass any substances and compounds substantially of biological origin that have properties that are relevant within the framework of scien-

tific, diagnostic and/or pharmaceutical applications. Encompassed are not only native molecules, such as those that can be isolated from natural sources, but also forms, fragments and derivatives derived therefrom, as well as recombinant forms and artificial molecules, as long as at least one property of the native molecules is present. Preferred biological samples are those that can be applied for analytical, diagnostic and/or pharmaceutical purposes, such as, but not limited to, nucleic acids and their derivatives (e.g., oligonucleotides, DNA, cDNA, PCR products, genomic DNA, plasmids, chromosomes, artificial chromosomes, gene transfer vectors, RNA, mRNA, tRNA, sRNA, miRNA, hnRNA, ribozymes, peptide nucleic acid (PNA)), polypeptides and proteins (e.g., enzymes, receptor proteins, protein complexes, peptide hormones, antibodies, lipoproteins, glycoproteins, inteins, prions), as well as biologically active fragments thereof, carbohydrates and their derivatives (e.g., glycolipids, glycosylated proteins, glycosides, oligosaccharides, mono- and poly-saccharides, and glycosaminoglycans), and lipids and their derivatives (e.g., fats, fatty acids, glycerides, triglycerides, phospholipids, steroids, prostaglandins, and leukotrienes).

It will be clear to one of skill in the art, based on the present disclosure, that the compositions and processes according to embodiments encompassed by the present invention can also be applied to cellular tissues and to complete cells, as well as to portions thereof (e.g., organelles, membranes and membrane fragments, homogenates, extracts, subcellular fractions, lysates, etc.) as long as such derived portions are carriers of the above described biomolecules. For this reason, tissues, cells and portions thereof and the like are basically encompassed by the term “biological sample”.

Accordingly, the term “biological sample” may be regarded in its broadest sense, for instance, to refer to a vertebrate or invertebrate cell or tissue, for example in the case of vertebrate cells, to a fish cell (e.g., a zebrafish cell, or a pufferfish cell, etc.), an amphibian cell (e.g., a frog cell), an avian cell, a reptilian cell, a mammalian cell, etc. Examples of mammals include humans or non-human mammals, such as a monkey, ape, cow, sheep, goat, buffalo, antelope, oxen, horse, donkey, mule, deer, elk, caribou, water buffalo, camel, llama, alpaca, rabbit, pig, mouse, rat, guinea pig, hamster, dog, cat, etc. Also envisaged in other embodiments are biological samples that may comprise non-mammalian animals or organs derived therefrom, including, for example, annelids, mollusks, sponges, cnidaria, arthropods, amphibians, fish, birds and reptiles.

In certain other embodiments a biological sample may refer to microorganisms that are derived from aquatic plankton, animal tissues and organs as described above, microbial mats, clusters, sludge, flocs, or biofilms. Microorganisms of the “aquatic” plankton comprises bacterial plankton, archaeal plankton, viruses and phytoplankton, as well as zooplankton.

According to other embodiments, the term “biological sample” may include a specimen or culture obtained from any source (animal, plant, bacteria, virus, etc.) such as a subject or biological source, as well as from biological and environmental samples. Biological samples may be obtained from any vertebrate or non-vertebrate and may encompass fluids, solids, tissues, and gases. Environmental samples include environmental material such as surface matter, soil, water, biofilms, microbial mats, industrial samples, etc.

As used herein, “soil” is the complex product of geological and biological processes acting on inorganic minerals and biomass deposited on the earth’s surface. It contains the

majority of biodiversity on earth (Whitman et al., (1998) *Proc. Natl. Acad. Sci. USA*, 95(12,6578-83) acting to recycle and biomineralize organic matter, and serves as a substratum to anchor and nourish higher plants.

Biofilms are microbial assemblages on the surface in "aqueous environments" in which microbes are embedded in a hydrated polymeric matrix. This matrix acts like a glue, holding the microbes together, attaching them to the surface and protecting them from detrimental external influences. They may contain several taxonomically distinct species (e.g., bacteria, fungi, algae, and protozoa), and may form on solid or liquid surfaces of diverse composition, such as metals, glass, plastics, tissue, minerals, and soil particles. Microbial mats and cluster are microbial assemblage/aggregates similar to biofilms in composition, however, not necessarily as firmly attached as solid surfaces.

Certain embodiments relate to a biological sample that may comprise an isolated biomolecule, where the term "isolated" means that the material is removed from its original environment (e.g., the natural environment if it is naturally occurring). For example, a naturally occurring nucleic acid or polypeptide present in an intact cell or in a living animal is not isolated, but the same nucleic acid or polypeptide, separated from some or all of the co-existing materials in the natural system, is isolated. Such nucleic acids could be part of a vector and/or such nucleic acids or polypeptides could be part of a composition, and still be isolated in that such vector or composition is not part of its natural environment.

Certain herein described embodiments relate to stabilization and/or preservation of a biological sample, which involves maintenance, retention or reconstitution of the structural and/or functional integrity of biological samples (including of molecular, multimolecular or oligomeric, organellar, subcellular, cellular, multicellular, or higher organizational levels of biological structure and/or function) and of the biological properties based thereupon. The biological activity of a biological sample that comprises, in a particular embodiment, a macromolecule or biopolymer or the like such as a polypeptide or polynucleotide, may involve, for example, the extensive maintenance of its primary, secondary and/or tertiary structure. The biological activity of a nucleic acid probe comprises, for example, its property of forming in a sequence-specific manner a hybridization complex (e.g., a duplex) with a nucleic acid target which is complementary to the probe. The biological activity of an antibody comprises, for example, a specific binding interaction with its cognate antigen.

As described herein, the biological activity of a substance means any activity which can affect any physical or biochemical properties of a biological system, pathway, molecule, or interaction relating to an organism, including for example but not limited to, viruses, bacteria, bacteriophage, prions, insects, fungi, plants, animals, and humans. Examples of substances with biological activity include, but are not limited to, polynucleotides, peptides, proteins, enzymes, antibodies, small molecules (e.g., a bioactive small molecule), pharmaceutical compositions (e.g., drugs), vaccines, carbohydrates, lipids, steroids, hormones, chemokines, growth factors, cytokines, liposomes, and toxins, liposomes. Persons familiar with the relevant art will recognize appropriate assays and methods for determining the biological activity of substances that affect the physical or biochemical properties of a biological system, for example, one or more biological activities that may include, but are not limited to, gene expression (see, e.g., Asubel, F M et al. (Eds.). 2007. *Current Protocols in Molecular*

Biology, Wiley and Sons, Inc. Hoboken, N.J.), receptor-ligand interactions (see for example, Coligan et al. (Eds.). 2007. *Current Protocols in Immunology*, Wiley and Sons, Inc. Hoboken, N.J.), enzymatic activity (see, e.g., Eienthal and Hanson (Eds.), *Enzyme Assays*, Second Edition. *Practical Approaches* series, No. 257. 2002, Oxford University Press, Oxford, UK; Kaplan and Colowick (Eds.), *Preparation and Assay of Enzymes, Methods in Enzymology*, (vols. 1, 2 and 6). 1955 and 1961, Academic Press, Ltd., Oxford, UK), cytokine, hormone and bioactive peptide activities and other cell proliferation (e.g., mitogenic) and/or differentiation activities (see for example, Coligan et al. (Eds.). 2007 *Current Protocols in Immunology*, Wiley and Sons, Inc. Hoboken, N.J.), signal transduction (see for example, Bonifacino et al. (Eds.) 2007 *Current Protocols in Cell Biology*, Wiley and Sons, Inc. Hoboken, N.J.) and cell toxicity (e.g., cytotoxicity, excitotoxicity) (see for example, Bus J S et al. (Eds) 2007 *Current Protocols in Toxicology*, Wiley and Sons, Inc. Hoboken, N.J.), apoptosis and necrosis (Green and Reed, 1998 *Science* 281(5381):1309-12; Green D R, 1998 *Nature* December 17: 629; Green D R, 1998 *Cell* 94(6):695-69; Reed, J C (Ed.), 2000 *Apoptosis, Methods in Enzymology* (vol. 322), Academic Press Ltd., Oxford, UK).

In certain embodiments, the invention relates to the long-term storage of biological, chemical and biochemical material under substantially liquid conditions, and in a manner ready for immediate use. As described herein, there are provided embodiments which include (a) the composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample as provided herein, comprising one or more compounds of formula (I) and one, two, or all three of at least on precipitating agent, at least one lower alcohol, and at least one chaotrope, and (b) preparation and optimization of the stable storage composition with compositions that increase the durability of the long-term storage conditions, including in certain embodiments, e.g., the use of one or more of a chelating agent, a reducing agent, a pH buffer, and water.

These and related embodiments thus provide advantages associated with liquid or semi-liquid storage of biological samples stored without refrigeration, including improved stabilization and preservation of biological activity in biological samples, reduced degradation of biological samples during storage at room temperature in liquid or semi-liquid form (e.g., hydrogel), and simplification of the processes for preparing, shipping and storing biological samples for further use by reducing or eliminating the need for refrigeration. Embodiments as described herein additionally provide superior biological sample recoveries by reducing or eliminating factors that can otherwise reduce sample recovery yields, such as undesirable sample degradation, denaturation and/or sample loss due to adsorption of the sample to sample container surfaces.

As used herein, "hydrogel" is not to be considered as limited to gels which contain water, but extend generally to all hydrophilic gels and gel composites, including those containing organic non-polymeric components in the absence of water. A gel is a state of matter that is intermediate between solids and liquids, and which consists of a solvent inside a three dimensional network.

Liquid Storage of a Biological Sample

Compositions and methods described herein relate to liquid and/or substantially liquid storage of a biological sample, and may include the use of any suitable container. These and related embodiments derive from the observation that stable, long-term liquid storage of biological samples or biological materials may be effected without refrigeration

when such samples or materials are stored in a stable storage composition such as those described herein, which include the compound(s) of formula (I). According to non-limiting theory, biological materials present in a biological sample may interact with one or more of the components of the herein described composition for substantially stable storage, by specific or non-specific binding or other mechanism of attachment, including those involving formation of non-covalent and/or covalent chemical bonds and or intermolecular associative interactions such as hydrophobic and/or hydrophilic interactions, hydrogen bond formation, electrostatic interactions, and the like. Accordingly, certain of the present invention embodiments provide devices for stable, long-term liquid or semi-liquid storage of biological samples at common indoor ambient room temperatures (e.g., typically 20-27° C. but varying as a function of geography, season and physical plant from about 15-19° C. or about 18-23° C. to about 22-29° C. or about 28-32° C.).

Preferred embodiments involve the use of sample storage devices as described herein that comprise a composition for substantially stable storage of nucleic acid and/or polypeptide molecules in a biological sample that comprises one or more compounds of formula (I) and which is capable of liquid or semi-liquid storage of a biological sample or a biological material without refrigeration, for example, at ambient room temperature. In certain preferred embodiments, there is little or no evaporation of biocompatible solvent (e.g., water) that is allowed to transpire by conditions under which the liquid-storable biological sample is maintained. The samples are preferably stored under liquid or substantially liquid conditions that stabilize the sample, i.e., little or no detectable (e.g., with statistical significance) degradation or undesirable chemical or physical modification of the sample occurs, according to criteria that will vary as a factor of the nature of the sample being stored and that will in any event be familiar to those having skill in the relevant art. As such, it will be appreciated from the present disclosure that according to certain preferred embodiments one or more of the sample, the compound(s) of formula (I), and the other herein described components of the stable storage composition will be in fluid contact with one another, e.g., present within a common liquid phase, such as a biocompatible solvent.

Non-limiting examples of sample storage devices may include, bottles, tubes, vials, bags, boxes, racks, multi-well dishes and multi-well plates, which are typically sealed by individual screw caps or snap caps, snap or seal closures, lids, adhesive strips or tape, or multi-cap strips. Other containers and vessels suitable for liquid-storable biological samples as described herein will be known to those familiar with the art, such as for example, specimen collection containers. In certain embodiments, the standard container format for medium to high throughput of sample storage, processing and automation of biological processes is a 96-, 384-, or 1536-well plate or array. Other information regarding biological sample storage devices in general may be found, for example, in US/20050276728 and US/20060099567, including references cited therein.

Certain preferred embodiments provide compositions and methods for storing biological material (e.g., genomic DNA, plasmid DNA, DNA fragments, RNA, oligonucleotides, proteins, polypeptides, peptides, fluorogenic substances, cells, viruses, bacteria, chemical compounds, vaccines, etc.) or other biological samples as provided herein in a mixture that is obtained by admixing the biological sample and the presently described stable storage composition, and that allows complete recovery or substantial recovery (e.g.,

recovery of at least 50 percent, preferably at least 60 percent, more preferably at least 70 percent, more preferably at least 80 percent, and typically in more preferred embodiments at least 85 percent, more preferably at least 90, 91, 92, 93 or 94 percent, more preferably at least 95 percent, still more preferably greater than 96, 97, 98 or 99 percent) of the sample material. For example, a stable storage composition may be selected based on the properties of one or more of the compound(s) of formula (I) and the precipitating agent(s), lower alcohol(s) and/or chaptrope(s), and/or other components as described herein (e.g., reducing agent, chelator, pH buffer, detergent or surfactant such as a non-denaturing detergent), and/or of the sample, depending on the particular methodology being employed and in a manner that permits recovery of one or more desired structural or functional properties of the sample (e.g., biological activity). Similarly, as another example, the stable storage composition alone or the mixture obtained by admixing the stable storage composition with the biological sample, may dissociate in an appropriate solvent and may, but need not, become fully solubilized, such that a dispersion, suspension, colloid, gel, hydrogel, sap, slurry, syrup, or the like may be obtained.

In certain preferred embodiments at least one solvent for use in compositions and methods disclosed herein will be aqueous, for example, water or a biocompatible solvent such as a biological fluid, a physiological solution or an aqueous biological buffer solution selected to support a biological structure and/or function of a biomolecule by preserving for that biomolecule a favorable chemical milieu that is conducive to the structure and/or function. Non-limiting examples of such biocompatible solvents include physiological saline (e.g., approximately 145 mM NaCl), Ringer's solution, Hanks' balanced salt solution, Dulbecco's phosphate buffered saline, Erle's balanced salt solution, and other buffers and solutions and the like as will be known to those familiar with the art, including those containing additives as may be desired for particular biomolecules of interest.

According to other embodiments, however, the invention need not be so limited and other solvents may be selected, for instance, based on the solvent polarity/polarizability (SPP) scale value using the system of Catalan et al. (e.g., 1995 *Liebigs Ann.* 241; see also Catalan, 2001 In: *Handbook of Solvents*, Wypych (Ed.), Andrew Publ., NY, and references cited therein), according to which, for example, water has a SPP value of 0.962, toluene a SPP value of 0.655, and 2-propanol a SPP value of 0.848. Methods for determining the SPP value of a solvent based on ultraviolet measurements of the 2-N,N-dimethyl-7-nitrofluorene/2-fluoro-7-nitrofluorene probe/homomorph pair have been described (Catalan et al., 1995). Solvents with desired SPP values (whether as pure single-component solvents or as solvent mixtures of two, three, four or more solvents; for solvent miscibility see, e.g., Godfrey 1972, *Chem. Technol.* 2:359) based on the solubility properties of a particular matrix material can be readily identified by those having familiarity with the art in view of the instant disclosure.

Based on the present disclosure, the skilled person will appreciate that, depending on the physicochemical properties (e.g., molecular mass, hydrophobicity, surface charge distribution, solubility, etc.) of a particular biomolecule of interest (e.g., a nucleic acid molecule such as DNA or RNA, or a polypeptide) that is present in a biological sample to be stored under liquid or semi-liquid conditions as described herein, one or more specific compounds of formula (I) can be identified readily and without undue experimentation, for use according to the present compositions and methods.

As described herein, a composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample may, according to certain embodiments (e.g., embodiments as set forth in Tables 1, 2, 3 and 4), be prepared from a solution (e.g., typically an aqueous solution) that comprises from at least about 0.1% to about 10% weight-to-volume of the compound(s) of formula (I), which in certain related embodiments may comprise from at least about 0.5% to about 5%, at least about 1% to about 5%, at least about 0.5%, 1.5%, 2%, 2.5%, 3%, 3.5%, 4%, 4.5%, 5%, 5.5%, 6%, 6.5%, 7%, 7.5%, 8%, 8.5%, 9%, 9.5% or 10% weight-to-volume of the compound(s) of formula (I), where "about" may be understood to represent quantitative variation that may be more or less than the recited amount by less than 50%, more preferably less than 40%, more preferably less than 30%, and more preferably less than 20%, 15%, 10% or 5%. Similar weight-to-volume ratios and tolerances may pertain for other components in at least some distinct embodiments of the herein described compositions for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample.

According to certain other embodiments, the composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample will be identified as having the compatible characteristics for storing a particular type of biological sample in a manner that satisfactorily preserves the desired structural and/or functional properties, said characteristics including the ability to substantially protect nucleic acid and/or polypeptide molecules in a biological sample from degradation during unrefrigerated storage following admixture of the sample with the stable storage composition.

According to non-limiting theory the molecules of the compound(s) of formula (I) may be capable of forming at least one hydrogen bond with a component of the biological sample in a manner that is preferential to hydrogen bond formation between the compound(s) of formula (I), but these invention embodiments are not so limited so long as the compound(s) of formula (I) does not covalently self-assemble. According to non-limiting theory, stabilizing interactions among the biological sample, the compound(s) of formula (I) and/or other components of the herein described composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample, result from hydrogen-bonding interactions. However, other non-covalent forces may also contribute to the bonding such as, for example, ionic bonds, electrostatic forces, van der Waal's forces, metal coordination, hydrophobic forces and, when the hydrogen-bonding moieties comprise one or more aromatic rings, pi-pi stacking (Russell, J B. 1999. *General Chemistry*. Second Edition. McGraw-Hill, Columbus, Ohio; Lodish et al. (Eds.) 2000. *Molecular Cell Biology*. Fourth Edition. W. H. Freeman).

Also according to non-limiting theory, the compound of formula (I) in the herein described composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample is capable of non-covalent association with one or more additional components of said stable storage composition, and may also be capable of non-covalent association with one or more molecular species present in the liquid-storable biological sample and having origins in the subject or biological source (e.g., biomolecules such as polypeptides, polynucleotides, naturally occurring oligosaccharides, naturally occurring lipids, and the like). Methodologies and instrumentation for the determination of non-covalent associations between such components will be known to those familiar with the art in

view of the present disclosure, and may include techniques such as electrospray ionization mass spectrometry (Loo et al., 1989 *Anal. Biochem. June*; 179(2):404-412; Di Tullio et al. 2005 *J. Mass Spectrom.* July; 40(7):845-865), diffusion NMR spectroscopy (Cohen et al., 2005 *Angew Chem Int Ed Engl.* January 14; 44(4):520-554), or other approaches by which non-covalent associations between molecular species of interest can be demonstrated readily and without undue experimentation (for example, circular dichroism spectroscopy, scanning probe microscopy, spectrophotometry and spectrofluorometry, and nuclear magnetic resonance of biological macromolecules; see e.g., Schalley C A et al. (Eds.) *Analytical Methods in Supramolecular Chemistry*, 2007, Wiley Publishers, Hoboken, N.J.; Sauvage and Hosseini (Eds.), *Comprehensive Supramolecular Chemistry*, 1996 Elsevier Science, Inc., New York, London, Tokyo; Cragg, P J (Ed.), *A Practical Guide to Supramolecular Chemistry*, 2005 Wiley & Sons, Ltd., West Sussex, UK; James et al. (Eds.), 2001 and 2005, *Nuclear Magnetic Resonance of Macromolecules: Methods in Enzymology* (vols. 338, 399 and 394) Academic Press, Ltd., London, UK).

In certain embodiments and as may be recognized by the skilled artisan in view of the present disclosure, it may be desirable to include in the herein described composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample a biological inhibitor or a biochemical inhibitor, which may be a reducing agent, an alkylating agent, an antimicrobial agent, a kinase inhibitor, a phosphatase inhibitor, a caspase inhibitor, a granzyme inhibitor, a cell adhesion inhibitor, a cell division inhibitor, a cell cycle inhibitor, a small molecule inhibitor, a lipid signaling inhibitor and/or a protease inhibitor. Those familiar with the art will be aware of a wide range of readily available inhibitors that may be selected depending on the nature of the biological sample and the particular bioactivity of interest. See, e.g., Calbiochem® Inhibitor SourceBook™ (2004 (1st Ed.) and 2007 (2nd Ed.), EMD Biosciences, La Jolla, Calif.). For antimicrobial agents, see, e.g., Pickering, L K, Ed. 2003 *Red Book: Report of the Committee on Infectious Diseases*, 26th edition. Elk Grove Village, Ill., pp. 695-97; American Academy of Pediatrics, 1998, *Pediatrics*, 101(1), supplement; *Disinfection Sterilization and Preservation*, Seymour S. Block (Ed.), 2001 Lippincott Williams & Wilkins, Philadelphia; *Antimicrobial Inhibitors*, A. I. Laskin and H. A. Lechevalier, (Eds.), 1988 CRC Press, Boca Raton, Fla.; *Principles and Practice of Disinfection, Preservation and Sterilization*, A. D. Russell et al., (Eds.), 1999, Blackwell Science, Malden, Mass.; *Antimicrobial/anti-infective materials*, S. P. Sawan et al., (Eds.), 2000 Technomic Pub. Co., Lancaster, Pa.; *Development of novel antimicrobial agents: emerging strategies*, K. Lohner, (Ed.), 2001 Wymondham, Norfolk, UK; Conte, J. E. *Manual of antibiotics and infectious diseases* (9th Ed.), 2001, Lippincott Williams & Wilkins, Philadelphia.

Biological material provided in or derived from a biological sample may be added to the wells or tubes in combination with the composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample in liquid form (e.g., by simultaneously contacting the sample well with the sample and stable storage composition dissolved or dissociated in a solvent, for instance, water). If, following unrefrigerated storage, purification is required of stabilized nucleic acid and/or polypeptide molecules from the mixture obtained by admixing the biological sample and the composition for substantially stable storage of nucleic acid and polypeptide molecules, the nucleic acid(s) and/or polypeptide(s) can be

isolated from the sample using techniques well known to those in the art, such as extraction, filtration, centrifugation, ion exchange, size exclusion, chromatography, or phase separation, or other purification methods known to those persons trained in the relevant art.

Detectable Indicator

Detectable indicators include compositions that permit detection (e.g., with statistical significance relative to an appropriate control, as will be known to the skilled artisan) or similar determination of any detectable parameter that directly relates to a condition, process, pathway, induction, activation, inhibition, regulation, dynamic structure, state, contamination, degradation or other activity or functional or structural change in a biological sample, including but not limited to altered enzymatic (including proteolytic and/or nucleolytic), respiratory, metabolic, catabolic, binding, catalytic, allosteric, conformational, or other biochemical or biophysical activity in the biological sample, and also including interactions between intermediates that may be formed as the result of such activities, including metabolites, catabolites, substrates, precursors, cofactors and the like.

A wide variety of detectable indicators are known to the art and can be selected for inclusion in the presently disclosed compositions and methods depending on the particular parameter or parameters that may be of interest for particular biological samples in particular sample storage applications. Non-limiting examples of parameters that may be detected by such detectable indicators include detection of the presence of one or more of an amine, an alcohol, an aldehyde, a thiol, a sulfide, a nitrite, avidin, biotin, an immunoglobulin, an oligosaccharide, a nucleic acid, a polypeptide, an enzyme, a cytoskeletal protein, a reactive oxygen species, a metal ion, pH, Na⁺, K⁺, Cl⁻, a cyanide, a phosphate, selenium, a protease, a nuclease, a kinase, a phosphatase, a glycosidase, and a microbial contaminant, and others.

Examples of a broad range of detectable indicators (including colorimetric indicators) that may be selected for specific purposes are described in Haugland, 2002 *Handbook of Fluorescent Probes and Research Products—Ninth Ed.*, Molecular Probes, Eugene, Oreg.; in Mohr, 1999 *J. Mater. Chem.*, 9: 2259-2264; in Suslick et al., 2004 *Tetrahedron* 60:11133-11138; and in U.S. Pat. No. 6,323,039. (See also, e.g., Fluka Laboratory Products Catalog, 2001 Fluka, Milwaukee, Wis.; and Sigma Life Sciences Research Catalog, 2000, Sigma, St. Louis, Mo.) A detectable indicator may be a fluorescent indicator, a luminescent indicator, a phosphorescent indicator, a radiometric indicator, a dye, an enzyme, a substrate of an enzyme, an energy transfer molecule, or an affinity label. In certain preferred embodiments the detectable indicator may be one or more of phenol red, ethidium bromide, a DNA polymerase, a restriction endonuclease (e.g., a restriction enzyme used as a restriction nuclease such as a site- or sequence-specific restriction endonuclease), cobalt chloride (a moisture indicator that changes from blue color when water is present to pink when dry), Reichardt's dye (Aldrich Chemical) and a fluorogenic protease substrate.

A detectable indicator in certain embodiments may comprise a polynucleotide polymerase and/or a suitable oligonucleotide, either or both of which may be employed as an indicator or, in certain other embodiments, as components of other nucleic acids-based applications of the compositions and methods described herein. For example, one or more oligonucleotides may be included for use as reference controls having use to adjust the amounts of different samples that are used in downstream processing by standardizing

their concentrations, or a range of oligonucleotide amounts may be employed to generate a quantitative calibration curve. Polymerases (including DNA polymerases and RNA polymerases) useful in accordance with certain embodiments of the present invention include, but are not limited to, *Thermus thermophilus* (Tth) DNA polymerase, *Thermus aquaticus* (Taq) DNA polymerase, *Thermoloba neopolitana* (Tne) DNA polymerase, *Thermotoga maritima* (Tma) DNA polymerase, *Thermococcus litoralis* (Tli or VENTTM) DNA polymerase, *Pyrococcus furiosus* (Pfu) DNA polymerase, DEEPVENTTM DNA polymerase, *Pyrococcus woosii* (Pwo) DNA polymerase, *Bacillus sterothermophilus* (Bst) DNA polymerase, *Bacillus caldophilus* (Bca) DNA polymerase, *Sulfolobus acidocaldarius* (Sac) DNA polymerase, *Thermoplasma acidophilum* (Tac) DNA polymerase, *Thermus flavus* (Tfl/Tub) DNA polymerase, *Thermus ruber* (Tru) DNA polymerase, *Thermus brockianus* (DYNAZYMETM) DNA polymerase, *Methanobacterium thermoautotrophicum* (Mth) DNA polymerase, *mycobacterium* DNA polymerase (Mtb, Mlep), and mutants, and variants and derivatives thereof. RNA polymerases such as T3, T5 and SP6 and mutants, variants and derivatives thereof may also be used in accordance with the invention.

Polymerases used in accordance with the invention may be any enzyme that can synthesize a nucleic acid molecule from a nucleic acid template, typically in the 5' to 3' direction. The nucleic acid polymerases used in the present invention may be mesophilic or thermophilic, and are preferably thermophilic. Preferred mesophilic DNA polymerases include T7 DNA polymerase, T5 DNA polymerase, Klenow fragment DNA polymerase, DNA polymerase III and the like. Preferred thermostable DNA polymerases that may be used in the methods of the invention include Taq, Tne, Tma, Pfu, Tfl, Tth, Stoffel fragment, VENTTM and DEEPVENTTM DNA polymerases, and mutants, variants and derivatives thereof (U.S. Pat. No. 5,436,149; U.S. Pat. No. 4,889,818; U.S. Pat. No. 4,965,188; U.S. Pat. No. 5,079,352; U.S. Pat. No. 5,614,365; U.S. Pat. No. 5,374,553; U.S. Pat. No. 5,270,179; U.S. Pat. No. 5,047,342; U.S. Pat. No. 5,512,462; WO 92/06188; WO 92/06200; WO 96/10640; Barnes, W. M., *Gene* 112:29-35 (1992); Lawyer et al., *PCR Meth. Appl.* 2:275-287 (1993); Flaman et al., *Nucl. Acids Res.* 22(15):3259-3260 (1994)).

Other detectable indicators for use in certain embodiments contemplated herein include affinity reagents such as antibodies, lectins, immunoglobulin Fc receptor proteins (e.g., *Staphylococcus aureus* protein A, protein G or other Fc receptors), avidin, biotin, other ligands, receptors or counterreceptors or their analogues or mimetics, and the like. For such affinity methodologies, reagents for immunometric measurements, such as suitably labeled antibodies or lectins, may be prepared including, for example, those labeled with radionuclides, with fluorophores, with affinity tags, with biotin or biotin mimetic sequences or those prepared as antibody-enzyme conjugates (see, e.g., Weir, D. M., *Handbook of Experimental Immunology*, 1986, Blackwell Scientific, Boston; Scouten, W. H., 1987 *Methods in Enzymology* 135:30-65; Harlow and Lane, *Antibodies: A Laboratory Manual*, 1988 Cold Spring Harbor Laboratory, Cold Spring Harbor, N.Y.; Haugland, *Handbook of Fluorescent Probes and Research Products—Ninth Ed.*, 2002 Molecular Probes, Eugene, Oreg.; Scopes, R. K., *Protein Purification: Principles and Practice*, 1987, Springer-Verlag, NY; Hermanson, G. T. et al., *Immobilized Affinity Ligand Techniques*, 1992, Academic Press, Inc., NY; Luo et al., 1998 *J. Biotechnol.* 65:225 and references cited therein).

Certain other embodiments of the present invention relate to compositions and methods for liquid or semi-liquid storage of a biological sample wherein the mixture obtained by admixing the biological sample and the composition for substantially stable storage of nucleic acid and polypeptide molecules contains at least one, and in certain related embodiments two, three, four, five, six, seven, eight, nine, ten or more detectable indicators, each of which comprises a unique and readily identifiable gas chromatography/mass spectrometry (GCMS) tag molecule. Numerous such GCMS tag molecules are known to the art and may be selected for use alone or in combination as detectable identifier moieties, for instance, to encode unique GCMS spectrometric profiles for separate storage mixtures in distinct sample storage containers, such as separate wells of a multi-well storage plate. By way of illustration and not limitation, various different combinations of one, two or more such GCMS tags may be added to individual wells in a manner that permits each well to be identified on the basis of the GCMS "signature" of its contents, thereby permitting any sample that is subsequently removed from a storage device well to be traced back to its well of origin for identification purposes. Examples of GCMS tags include α,α,α -trifluorotoluene, α -methylstyrene, o-anisidine, any of a number of distinct cocaine analogues or other GCMS tag compounds having readily identifiable GCMS signatures under defined conditions, for instance, as are available from SPEX CertiPrep Inc. (Metuchen, N.J.) or from SigmaAldrich (St. Louis, Mo.), including Supelco® products described in the Supelco® 2005 gas chromatography catalog and available from SigmaAldrich.

The composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample may be applied to storage containers for biological samples, for example, by contacting or administering the composition in a solvent to one or a plurality of sample wells of a storage device as described herein. Biological material provided in or derived from a biological sample may also be added to the wells or tubes in combination with the storage composition in liquid (including liquid suspensions) form (e.g., by simultaneously contacting the sample well with the sample and the storage composition dissolved or dissociated in a solvent).

The conditions (e.g., pH, ionic strength, polarity, solubilization capacity) in the composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample may be adjusted such that greater than at least 90 percent, preferably greater than 95 percent, more preferably greater than 96, 97, 98 or 99 percent of the biological activity (e.g., enzymatic or affinity activity, or structural integrity or other biological activity as described herein and known to the art) of the biological sample is maintained following unrefrigerated storage of the mixture obtained by admixing the stable storage composition and the biological sample. It will be appreciated, for example, that in addition to the unprecedented advantages provided by the composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample as described herein for the first time, buffer conditions and the addition of certain chemicals and enzymes and other reagents may contribute to the stabilization of DNA and RNA (for example, Sambrook, J., Fritsch, E. F. and Maniatis, T. (1989) *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory Press, New York; Current Protocols, *Nucleic Acid Chemistry, Molecular Biology*, Wiley and Sons, 2003) and/or proteins, polypeptides, enzymes and/or other biological materials (for example,

blood, tissue, bodily fluids) against degradation from enzymes, proteases and environmental factors (see, for example, Current Protocols, Protein Sciences, Cell Biology, Wiley and Sons, 2003). The further inclusion of certain such chemical components to provide beneficial effects on the biological sample are also contemplated and may vary according to particular samples and uses thereof (e.g., Calbiochem® Biochemicals & Immunochemicals Catalog 2004/2005, pp. 68-69 and pages cited therein, EMD Biosciences, La Jolla, Calif.; and suitable solutes such as salts (e.g., KCl, NaCl, CaCl₂, MgCl₂, etc.) for maintaining, preserving, enhancing, protecting or otherwise promoting one or more biological sample components (e.g., biomolecules), or activity buffers that may be selected and optimized for particular activities of specific biomolecules such as nucleic acid hybridization or activities of enzymes, antibodies or other proteins, or other buffers, for instance, Tris buffer (THAM, Trometanol, 2-amino-2-(hydroxymethyl)-1, 3-propane diol), Tris-EDTA buffer (TE), sodium chloride/sodium citrate buffer (SSC), MOPS/sodium acetate/EDTA buffer (MOPS), ethylenediamine tetraacetic acid (EDTA), sodium acetate buffer at physiological pH, and the like.)

Additional chemical components that may beneficially enhance the recovery of biological activity from a biological sample stored without refrigeration using the herein described stable storage composition may also include but are not limited to solutes that may be included in the biocompatible solvent of which the storage composition is comprised (along with the compound(s) of formula (I) and other components as described herein), where such solutes may provide a desired isotonic, hypertonic or hypotonic environment as may be selected by those familiar with the art, for example an isotonic saline solution to prevent disruption of cellular membranes. Hence, as will be appreciated by those skilled in the art in view of the present disclosure, depending on the particular biological sample to be stored and on the particular biological activity to be recovered from such sample (e.g., DNA, RNA, polypeptide), it may be desirable to formulate the stable storage composition with a biocompatible solvent that is isotonic, hypertonic or hypotonic relative to the sample.

By way of background, osmotic shock results from exposure of cells to solutions of different osmotic pressures, where osmosis involves the net diffusion of water across a selectively permeable membrane that is permeable in both directions to water, but varyingly permeable to solutes, wherein the water diffuses from one solution into another of lower water potential. The osmotic pressure of a solution is the pressure which must be exerted upon it to prevent passage of distilled water into it across a semipermeable membrane (i.e., a membrane that is impermeable to all solutes, but is freely permeable to solvent), and is often measured in Pascals (1 Pa=1 Newton/m²). Conversely, water potential is the net tendency of any system to give up water to its surroundings. As the water potential of pure water at atmospheric pressure is, by definition, zero pressure units, any addition of solute to pure water reduces its water potential and makes its value negative. Thus, water movement is from a system with higher (i.e., less negative) water potential to one with lower (i.e., more negative) water potential.

Hence, according to certain herein disclosed embodiments, a biological sample may comprise a suspension of cells in a hypertonic liquid medium, such as one formulated with a biocompatible solvent having a solute concentration that is higher than that inside the cells present in the liquid solution, thus causing water to diffuse out of the cells. In

these and related embodiments a hypertonic liquid matrix is provided having a greater relative solute concentration when compared to the solute concentration of a membrane-bound liquid compartment such as that within the cell (e.g., the cytosol is hypotonic relative to the stable storage composition). Such a hypertonic solution has a lower water potential than a solution that is hypotonic to it and has a correspondingly greater osmotic pressure. Thus, for instance, a hypotonic solution has a solute concentration that is lower than the solute concentration inside cells suspended in that solution, and therefore causes water to diffuse into the cells. A hypotonic solution has a lower relative solute concentration (i.e., higher water potential) than another solution. Certain other embodiments relate to liquid formulations that may be isotonic solutions that have solute concentrations that are equal to intracellular solute concentrations (i.e., as indicated by their osmotic pressure). Separation of isotonic solutions by selectively permeable membranes (e.g., cell membranes) results in no net passage of water in either direction across the cell membrane, since the solutions have the same water potential.

Other chemical components that may be included in stable storage compositions described herein include human placental ribonuclease inhibitor, bovine ribonuclease inhibitor, porcine ribonuclease inhibitor, diethyl pyrocarbonate, formamide, vanadyl-ribonucleoside complexes, macaloid, proteinase K, heparin, hydroxylamine-oxygen-cupric ion, bentonite, ammonium sulfate, or specific inhibiting antibodies.

Accordingly, certain invention embodiments contemplate a composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample, comprising one or more compound(s) of formula (I) and additional components as described herein, and a sample treatment composition. The sample treatment composition may comprise an activity buffer as described below, and/or the sample treatment composition may comprise one or more of a cell lysis buffer, a free radical trapping agent, a sample denaturant, and a pathogen-neutralizing agent. As provided by these embodiments, the stable storage composition may thus comprise a set of components prepared to effect a desired treatment on a biological sample when the sample is admixed with the stable storage composition.

An activity buffer may comprise a solvent or solution in liquid form, including a concentrate, which is suitable for a desired use of the biological sample, for example following unrefrigerated storage, such as a functional or structural characterization of one or more components of the sample.

Non-limiting examples of such uses may include determining one or more enzyme activities, determining intermolecular binding interactions, detecting the presence of a specific polynucleotide or amino acid sequence or of an immunologically defined epitope or of a defined oligosaccharide structure, detection of particular viruses or of microbial cells or of human or animal cells, determining particular metabolites or catabolites, etc., all of which can be accomplished using conditions that are defined and known to those skilled in the relevant art, including suitable conditions that can be provided through contacting the sample with an appropriate activity buffer.

A cell lysis buffer may be any composition that is selected to lyse (i.e., disrupt a boundary membrane of) a cell or organelle, and many such formulations are known to the art, based on principles of osmotic shock (e.g., hypotonic shock) and/or disruption of a cell membrane such as a plasma membrane through the use of a surfactant such as a detergent (e.g., Triton® X-100, Nonidet® P-40, sodium dodecyl sul-

fate, deoxycholate, octyl-glucopyranoside, betaines, or the like) and/or solute (e.g., urea, guanidine hydrochloride, guanidinium isothiocyanate, high salt concentration) system. Numerous cell lysis buffers are known and can be appropriately selected as a function of the nature of the biological sample and of the biomolecule(s), biological activities or biological structures that are desirably recovered, which may also in some embodiments include the selection of appropriate pH buffers, biological or biochemical inhibitors and detectable indicators.

Sample denaturants similarly may vary as a function of the biological sample and the stable storage composition, but may include an agent that non-covalently alters (e.g., with statistical significance relative to an appropriate control such as an untreated sample) at least one of the three-dimensional conformation, quaternary, tertiary and/or secondary structure, degree of solvation, surface charge profile, surface hydrophobicity profile, or hydrogen bond-forming capability of a biomolecule of interest in the sample. Examples of sample denaturants include chaotropes (e.g., urea, guanidine, thiocyanate salts), detergents (e.g., sodium dodecyl sulfate), high-salt conditions or other agents or combinations of agents that promote denaturing conditions. As also noted above, certain embodiments are contemplated that expressly exclude, for certain types of samples, the use of a sample denaturant when a chelator is also present, while certain other embodiments may include such components.

Free radical trapping agents for use in certain embodiments may include any agent that is capable of stably absorbing an unpaired free radical electron from a reactive compound, such as reactive oxygen species (ROS), for example, superoxide, peroxyxynitrite or hydroxyl radicals, and potentially other reactive species, and antioxidants represent exemplary free radical trapping agents. Accordingly a wide variety of known free radical trapping agents are commercially available and may be selected for inclusion in certain embodiments of the presently disclosed compositions and methods. Examples include ascorbate, beta-carotene, vitamin E, lycopene, tert-nitroisobutane, alpha-phenyl-tert-butyl nitron, 5,5-dimethylpyrroline-N-oxide, and others, as described in, e.g., Halliwell and Gutteridge (*Free Radicals in Biology and Medicine*, 1989 Clarendon Press, Oxford, UK, Chapters 5 and 6); Vanin (1999 *Meth. Enzymol.* 301:269); Marshall (2001 *Stroke* 32:190); Yang et al. (2000 *Exp. Neurol.* 163:39); Zhao et al. (2001 *Brain Res.* 909:46); and elsewhere.

Certain embodiments contemplate inclusion of a pathogen-neutralizing agent in the presently disclosed compositions and methods, which includes any agent that is capable of completely or partially, but in any event in a manner having statistical significance relative to an appropriate control, neutralizing, impairing, impeding, inhibiting, blocking, preventing, counteracting, reducing, decreasing or otherwise blocking any pathogenic effect of a pathogen such as a bacterium, virus, fungus, parasite, prion, yeast, protozoan, infectious agent or any other microbiological agent that causes a disease or disorder in humans or vertebrate animals. Persons familiar with the relevant art will recognize suitable pathogen-neutralizing agents for use according to the present disclosure. Exemplary agents include sodium azide, borate, sodium hypochlorite, hydrogen peroxide or other oxidizing agents, sodium dichloroisocyanurate, ethanol, isopropanol, antibiotics, fungicides, nucleoside analogues, antiviral compounds, and other microbicides; these or others may be selected according to the properties of the particular biological sample of interest.

Accordingly and in view of the present disclosure, certain preferred embodiments contemplate compositions and methods for the stable unrefrigerated storage for extended time periods of biological samples that contain RNA, whereby substantial recovery of RNA can be achieved following storage (e.g., relative to the recovery that may be achieved following sample storage at -80°C .), wherein the composition comprises any one of formulations 3.4, 3.5, 3.6, 3.20, 3.21 or 3.24 (see Table 3), and wherein in certain such embodiments the sample comprises whole blood (e.g., mammalian blood, for example, primate blood such as human blood) or a fraction or component thereof. Certain other preferred embodiments contemplate compositions and methods for the stable unrefrigerated storage for extended time periods of biological samples that contain DNA, whereby substantial recovery of DNA can be achieved following storage (e.g., relative to the recovery that may be achieved following sample storage at -20°C .), wherein the composition comprises any one of formulations 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.20, 3.21 or 3.24 (see Table 3), and wherein in certain such embodiments the sample comprises whole blood (e.g., mammalian blood, for example, primate blood such as human blood) or a fraction or component thereof.

Also provided herein are embodiments directed to kits that comprise the composition for substantially stable storage of nucleic acid and polypeptide molecules in a biological sample as described herein, along with one or more ancillary reagents that may be selected for desired uses. Optionally the kit may also include a box, case, jar, drum, drawer, cabinet, carton, carrier, handle, rack, tray, pan, tank, bag, envelope, sleeve, housing or the like, such as any other suitable container. Ancillary reagents may include one or more solvents or buffers as described herein and known to the art, and may in certain embodiments include an activity buffer.

It is contemplated that the present invention will be of major value in high throughput screening; i.e., in automated testing or screening of a large number of biological samples. It has particular value, for example, in screening synthetic or natural product libraries for active compounds. The apparatus and methods of the present invention are therefore amenable to automated, cost-effective high throughput biological sample testing or drug screening and have immediate application in a broad range of pharmaceutical drug development programs. Typically, and in certain preferred embodiments such as for high throughput drug screening, candidate agents are provided as "libraries" or collections of compounds, compositions or molecules. Such molecules typically include compounds known in the art as "small molecules" and having molecular weights less than 10^5 daltons, preferably less than 10^4 daltons and still more preferably less than 10^3 daltons. Candidate agents further may be provided as members of a combinatorial library, which preferably includes synthetic agents prepared according to a plurality of predetermined chemical reactions performed in a plurality of reaction vessels, which may be provided as wells in a storage device according to the present disclosure. For example, various starting compounds may be prepared employing one or more of solid-phase synthesis, recorded random mix methodologies and recorded reaction split techniques that permit a given constituent to traceably undergo a plurality of permutations and/or combinations of reaction conditions. The resulting products comprise a library that can be screened followed by iterative selection and synthesis procedures, such as a synthetic combinatorial library of peptides (see e.g., PCT/US91/08694 and PCT/US91/04666) or other compositions that

may include small molecules as provided herein (see e.g., PCT/US94/08542, EP 0774464, U.S. Pat. No. 5,798,035, U.S. Pat. No. 5,789,172, U.S. Pat. No. 5,751,629).

The following Examples are presented by way of illustration and not limitation.

EXAMPLES

Example 1

Storage of Blood

This Example describes the preparation and characterization of a liquid-storable biological sample. In this and the following Examples, standard cell and molecular biology techniques were employed, essentially according to known methodologies (e.g., Sambrook, J., Fritsch, E. F. and Maniatis, T. (1989) *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory Press, New York; *Current Protocols, Nucleic Acid Chemistry, Molecular Biology*, Wiley and Sons, 2003; *Current Protocols, Protein Sciences, Cell Biology*, Wiley and Sons, 2003). All reagents in this and the following Examples were from Sigma-Aldrich (St. Louis, Mo.) unless otherwise specified.

Fresh whole human blood was collected in K_2EDTA tubes and mixed with formulations 1.1-1.3 (see Table 1) at various ratios. For the 2:1 ratio, 100 μL of blood was added to 50 μL of the respective formulations and mixed by vortexing the samples in a microfuge tube. For the 4:1 ratio, 100 μL of blood was added to 25 μL of each the respective formulations and mixed by vortexing. For the 8:1 ratio, 100 μL of blood was added to 12.5 μL of each of the respective formulations and mixed by vortexing. Samples were prepared for examination at multiple time points and stored at room temperature until processing. After 31 days at room temperature triplicate sample were processed using a QiaAmp (Qiagen, Valencia, Calif.) mini column purification kit following the protocol for blood provided by the manufacturer. Each sample was brought to 200 μL total before processing with phosphate buffered saline. Following genomic DNA isolation of the samples 10 μL of each 100 μL eluate was applied to individual lanes of a 0.8% agarose gel containing ethidium bromide and the gel electrophoresed at 120 V for 40 minutes. The 302 nm UV illuminated gel image was captured on a KODAK 100 gel system and is shown in FIG. 1.

Example 2

Stabilization of DNA in Whole Blood for 62 Days at Room Temperature

Formulations #1.1-1.3 (see Table 1) were mixed with blood at different ratios were examined after being stored for 62 days at room temperature. Three different commercially available kits were used to isolate the DNA from the sample. The QiaAmp™ mini kit from Qiagen was used for extraction of the DNA from Formulation #1.1 and the non protected blood samples, while the Flexigene™ Kit also from Qiagen was used for extraction of the DNA from blood stored in Formulation #1.2 and the -20°C . stored blood samples, and a ChargeSwitch™ kit from Life Technologies was used to extract DNA from blood stored in Formulation #1.3. All samples were isolated in 100 μL of eluate. Following genomic DNA isolation of the samples 10 μL of each 100 μL eluate was applied to individual lanes of a 0.8% agarose gel containing ethidium bromide and the gel elec-

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trophoresed at 120 V for 40 minutes. The 302 nm UV illuminated gel image was captured on a KODAK 100 gel system and is shown in FIG. 2. The concentration of the DNA in the eluates from the 4:1 ratio of formulation #1.2, the non protected blood and the -20° C. control were calculated by UV spectroscopy using a Biotek Synergy 2 plate reader and the average total quantity of DNA from the replicates is shown in FIG. 3.

Example 3

DNA Recovery Following Unrefrigerated Storage of Blood

Formulations 1.1-1.3 (see Table 1) were mixed with blood at different ratios and the DNA extracted after moving the samples through a shipping simulation and then storing the samples for an additional 36 days at room temperature. The shipping simulation was conducted using the following protocol:

- a) Room Temp for 2 days
- b) 45° C. for 2 days
- c) Room Temp for 3 days
- d) -20° C. for 2 days
- e) Room Temp for 3 days
- f) 45° C. for 2 days

Following completion of the protocol the samples were held for an additional 36 days at room temperature and then extracted using three different commercially available kits to determine the quantity of DNA recovered from each of the samples. The QiaAmp™ mini kit from Qiagen was used for extraction of the DNA from Formulation #1.1 and the non protected blood samples, while the Flexigene™ Kit also from Qiagen was used for extraction of the DNA from blood stored in Formulation #1.2 and the -20° C. stored blood samples, and a ChargeSwitch™ kit from Life Technologies was used to extract DNA from Blood stored in Formulation #1.3. All samples were isolated in 100 μ L of eluate. Following genomic DNA isolation of the samples 10 μ L of each 100 μ L eluate was applied to individual lanes of a 0.8% agarose gel containing ethidium bromide and the gel electrophoresed at 120 V for 50 minutes. The 302 nm UV illuminated gel image was captured on a KODAK 100 gel system and is shown in FIG. 4. The concentration of the DNA in the eluates from the 4:1 ratio of formulation #1.2, the non protected blood and the -20° C. control were calculated by UV spectroscopy at 260 nm using a Biotek Synergy 2 plate reader and the average total quantity of DNA from the replicates is shown in FIG. 5.

Example 4

Stabilization of RNA in Human Whole Blood for 14 Days at Room Temperature

Whole blood was collected from a human donor in Vacutainers containing K_2 -EDTA as the anticoagulant. Tubes were mixed thoroughly, the hemogard closures removed and 300 μ L aliquots of the blood transferred to 2 mL eppendorf tubes containing 900 μ L of each of the indicated formulations (1.6-1.8, see FIG. 6) found in Table 1. Samples were mixed thoroughly by vortexing and stored at room temperature. Unprotected aliquots were prepared by addition of 300 μ L aliquots of blood to Eppendorf tubes. Frozen controls were prepared by addition of 300 μ L of blood to Eppendorf tubes and frozen in a -80° C. freezer. After 14 days at room temperature the tubes were spun at

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14000 g for 5 min to sediment the precipitate and the supernatant removed. The pellet was dissolved by mixing with 800 μ L of lysis solution and 50 μ L of the sodium acetate solution from the Ambion RiboPure™ Blood Kit (Ambion, Austin, Tex.). The samples were processed further according to the RiboPure™ Blood kit protocol to obtain a preparation containing RNA. The -80° C. control sample was allowed to warm and then processed with the unprotected control sample by addition of 800 μ L of lysis buffer and 50 μ L of sodium acetate. The controls were also processed alongside the protected samples and RNA was analyzed by agarose gel electrophoresis using a 1% non denaturing gel containing ethidium bromide run for 35 min at 150 V. The gel image (FIG. 6) was visualized on a Kodak Gel-100 system using UV transillumination at 302 nm.

Example 5

Stabilization of RNA in Blood at Room Temperature for 6 Days

Several additional nucleic acid-stabilizing formulations were prepared and mixed with human whole blood in like manner to that described in Example 4. The formulations that were used in this experiment are presented in Table 2. Following extraction of the RNA using the RiboPure™ blood kit as described above, the recovered nucleic acid-containing samples were analyzed by agarose gel electrophoresis. Representative results that were obtained using formulation #2.3 (Table 2) are shown in FIG. 7.

Example 6

Syntheses of Exemplary Compounds of Formula (I)

This example describes syntheses of three exemplary compounds of formula (I). All reagents were from Sigma-Aldrich (St. Louis, Mo.) unless otherwise noted.

Synthesis of 1-Hexyl-3-methylimidazolium bromide

A 35 mL glass pressure tube (Ace Glass Cat#8648-07) containing a stir bar was charged with 6.158 g (0.075 moles) of 1-methylimidazole followed by 12.380 g (0.075 moles) of 1-bromohexane. The tube was sealed with a threaded Teflon plug and an O-ring and the tubes were placed in an oil bath on a VWR stirring hot plate. The temperature was raised to 90° C. and maintained at this temperature for 16 hours during which time the solution became viscous and the stir bar had stopped. The tube was removed from the bath and mixed vigorously on a vortexing mixer to completely mix the two layers and the was tube replaced into the oil bath at 90° C. The tube was heated for another hour and then mixed vigorously a second time followed by another hour of heating at 90° C. The cycle was repeated once more until the viscous liquid was homogeneous. The liquid was extracted with equal volumes of ethyl acetate three times followed by rotary evaporation to remove the residual ethyl acetate to give 18.147 g of the 1-hexyl-3-methylimidazolium bromide as a viscous lightly yellow colored oil. Compound is also available from IoLiTec (Heilbronn, Germany).

Synthesis of 1-Octyl-3-methylimidazolium bromide

A 35 mL glass pressure tube (Ace Glass Cat#8648-07) containing a stir bar was charged with 4.105 g (0.050 moles) of 1-methylimidazole followed by 9.656 g (0.050 moles) of

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1-bromooctane. The tube was sealed with a threaded Teflon plug and an O-ring and the tubes were placed in an oil bath on a VWR stirring hot plate. The temperature was raised to 90° C. and maintained at this temperature for 16 hours during which time the solution became viscous and the stir bar had stopped. The tube was removed from the bath and mixed vigorously on a vortexing mixer to completely mix the two layers and the tube replaced into the oil bath at 90° C. and the temperature raised to 90° C. The tube was heated for another hour and then mixed vigorously a second time followed by another hour of heating at 90° C. The cycle was repeated once more until the viscous liquid was homogeneous. The liquid was extracted with equal volumes of ethyl acetate three times followed by rotary evaporation to remove the residual ethyl acetate to give 13.239 g of the 1-hexyl-3-methylimidazolium bromide as a viscous lightly yellow colored oil. Compound is also available from IoLiTec (Heilbronn, Germany).

Synthesis of 1-Decyl-3-methylimidazolium bromide

A 35 mL glass pressure tube (Ace Glass Cat#8648-07) containing a stir bar was charged with 4.105 g (0.050 moles) of 1-methylimidazole followed by 11.059 g (0.050 moles) of 1-bromodecane. The tube was sealed with a threaded Teflon plug and an O-ring and the tubes were placed in an oil bath on a VWR stirring hot plate. The temperature was raised to 90° C. and maintained at this temperature for 16 hours during which time the solution became viscous and the stir bar had stopped. The tube was removed from the bath and mixed vigorously on a vortexing mixer to completely mix the two layers and the tube replaced into the oil bath at 90° C. and the temperature raised to 100° C. The tube was heated for another hour and then mixed vigorously a second time followed by another hour of heating at 100° C. The cycle was repeated once more until the viscous liquid was homogeneous. The liquid was extracted with equal volumes of ethyl acetate three times followed by rotary evaporation to remove the residual ethyl acetate to give 14.532 g of the 1-hexyl-3-methylimidazolium bromide as a viscous lightly yellow colored oil. Compound is also available from IoLiTec (Heilbronn, Germany).

Example 7

Stabilization of Genomic DNA and RNA from 293T Cells

Human embryonic kidney (HEK) 293T cells (ATCC, Manassas, Va.) were cultivated according to standard cell culture procedures and harvested cells were washed and aliquoted cell pellets (5×10^5 cells/sample) were resuspended in 1004 of nucleic acid stabilization formulation 3.5 or 3.6 (Table 3) and stored at room temperature for 14 days. One control cell pellet was stored without protective additives at -80° C. for 14 days, and a second control pellet was stored without additives at room temperature. Following storage, genomic DNA and total RNA were extracted from each sample using the RNAqueous™ Kit (Ambion, Austin, Tex.) according to the manufacturer's instructions. Extracts were then analyzed by agarose gel electrophoresis (1.2% agarose, 1× Tris-acetate EDTA (TAE)). RNA from the control cell pellet stored without additives at room temperature was completely degraded and produced no discrete bands in electrophoresis. By contrast, multiple discrete RNA bands (including 18S and 28S rRNA and bands therebetween) were apparent in electrophoresed samples that had been

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stored in formulation 3.5 or 3.6, and these bands were more clearly resolved than corresponding bands in the -80° C. control. A well resolved high molecular weight band corresponding to genomic DNA was also visible in the electrophoretograms of samples that had been stored in formulation 3.5 or 3.6, and in the -80° C. control sample.

Example 8

Stabilization of RNA and Proteins in Mouse Brain Tissue Samples Stored at Room Temperature

Fresh murine brain tissue fragments (approximately 25 mg each) were obtained according to established laboratory animal tissue harvesting procedures and were stored in separate microfuge tubes at room temperature for 13 or 20 days either without any protective additive, or in the presence of 1004 of nucleic acid stabilization formulation 3.5 or 3.6 (Table 3). Control tissue fragments were stored at -80° C. without any protective additive. Following storage, total RNA was extracted from each sample using the RNAqueous™ Kit (Ambion, Austin, Tex.) according to the manufacturer's instructions, and RNA integrity was assessed using the Agilent RNA 6000 Nano Kit and an Agilent 2100 Bioanalyzer (Agilent Technologies Inc., Santa Clara, Calif.) according to the supplier's recommendations.

After 13 days, triplicate samples exhibited average RNA integrity (RIN) scores of approximately 7.5 for samples stored at room temperature in formulation 3.5, 2.5 for samples stored at room temperature with no stabilizer, and 7.8 for samples stored at -80° C. After 20 days, duplicate samples exhibited average RIN scores of approximately 7.1 for samples stored at room temperature in formulation 3.5, 6.7 for samples stored at room temperature in formulation 3.6, and 6.9 for samples stored at -80° C.

RNA recovered from the mouse brain samples stored for 13 days at room temperature in formulation 3.5 was also compared to RNA from samples stored for 13 days at -80° C., by quantitative real-time PCR (RT-qPCR) using oligonucleotide primer sets specific for murine GAPDH, p27 and Cdk2 cDNAs. RNA aliquots of 250 pg, 2.5 ng or 25 ng were reverse transcribed and the products amplified according to standard qPCR methodologies. Comparable results were obtained using RNA that had been stored for 13 days at room temperature in formulation 3.5 and RNA that had been stored for 13 days without any stabilizer at -80° C.

Mouse brain tissue fragments (approximately 25 mg each) prepared as described above were also stored for 14 days at room temperature either in formulation 3.5 (Table 3) or without stabilizers, and control samples were stored without stabilizers at -80° C., after which protein extracts were prepared using the SurePrep™ kit (Fisher Scientific, Pittsburgh, Pa.) according to the manufacturer's instructions. Protein concentrations in extracts were determined using the Pierce BCA assay (Thermo Fisher Scientific, Rockford, Ill.) and equivalent amounts of protein from each sample were analyzed electrophoretically on a 4-20% gradient tris-glycine polyacrylamide gel (Invitrogen, Carlsbad, Calif.). Following electrophoretic separation, proteins were electroblot-transferred to nitrocellulose membranes and stained with Ponceau S solution; blots were also probed immunochemically with antibodies specific for murine dynein 1 and murine β -actin according to standard western blot procedures.

By Ponceau S staining, multiple distinct protein bands were detected in the extract from the sample stored in formulation 3.5, several of which were more abundant or

more clearly resolved than in the otherwise comparable electrophoretogram of the extract from the sample stored at -80°C . The abundance and resolution of proteins in the extract from the sample stored at room temperature without a protective additive were poorer by comparison. Immunoblot analysis revealed comparable preservation of dynein 1 in the extracts from the sample stored in formulation 3.5 and the sample stored at -80°C ., but only weak dynein 1 bands were detectable in the extract from the sample stored at room temperature without a protective, stabilizing additive. Actin signals were readily detectable in extracts of samples stored under all three storage conditions, with a somewhat less pronounced actin band being detected in the extract from the sample stored at room temperature without a protective, stabilizing additive.

Example 9

Stabilization of Proteins in Human Breast Tumor Samples

Mouse brain tissue fragments (approximately 25 mg each) prepared as described in the preceding example, and also human breast cancer tissue fragments (approximately 25 mg each), were stored for three days, either at room temperature in the presence of formulation 3.5 (Table 3) or without stabilizers at -80°C . Protein extracts, electrophoretic separation of proteins, and electroblot transfer to nitrocellulose membranes were as described in the preceding example. Resolved proteins were detected by staining with amidoblack. The electrophoretograms of samples stored at room temperature in formulation 3.5 were comparable to those observed for samples stored without stabilizers at -80°C .

Example 10

Stabilization of RNA and DNA in Human Blood Samples Stored for Extended Time Periods without Refrigeration

Blood samples were drawn from healthy human volunteers and collected in tubes containing anti-coagulant according to standard procedures. Unfractionated blood samples were stored for 31 days at room temperature either without additives, or after admixture with one of formulations 3.1, 3.2 or 3.3 (Table 3) at volume:volume ratios of 2:1 and 8:1. A control blood sample was stored at -20°C . without additives. At the end of the storage period, genomic DNA was extracted and an aliquot of 100 ng was used as a PCR template for amplification of a 22 kilobase-pair fragment incorporating the PLAT gene, using the Manual PCR Extender System from 5 Prime Inc. (Gaithersburg, Md.) according to the supplier's instructions. Amplicons were analyzed by agarose gel electrophoresis (0.5% agarose, 1xTAE) using a lambda DNA HindIII digest ladder (New England Biolabs, Beverly, Mass.) as a reference standard.

From template DNA prepared from the samples that were stored at room temperature in blood admixed with formulations 3.1, 3.2, and 3.3, the 22 kb amplicon was clearly resolved and readily detectable as a band in electrophoretograms with an intensity that was greater than that seen for the corresponding amplicon obtained using template DNA recovered from the -20°C . control sample. A dramatically fainter band for this amplicon was observed when template DNA was used from the blood samples that had been stored at room temperature without additive.

Another similar experiment was performed to simulate storage conditions for unfractionated whole blood samples over the course of a shipping cycle. Blood samples were admixed with one of formulations 3.1, 3.2 or 3.3 (Table 3) at volume:volume ratios of 2:1, 4:1 and 8:1, or with PAXgene™ DNA (Qiagen, Valencia, Calif.) according to the supplier's instructions. Two sets of control samples received no additives or stabilizers, and one set was processed according to the simulated shipping cycle while the other set was stored at -20°C . The simulated shipping cycle was a sequence of five steps as follows: (i) two days at room temperature, (ii) two days at 45°C ., (iii) three days at room temperature, (iv) two days at -20°C ., (v) three days at room temperature, (vi) two days at 45°C . At the end of the simulated shipping cycle time period, genomic DNA was extracted from each sample and an aliquot of 100 ng was used as a PCR template for amplification of a 22 kilobase-pair fragment incorporating the PLAT gene, as described above. Electrophoretic analysis showed a strong, clearly resolved and readily detectable amplicon from the samples that had been stored using formulations 3.1, 3.2 and 3.3, with comparable intensity to the -20°C . storage control and greater intensity than the amplicon bands obtained from the samples stored using PAXgene™, which were in turn of greater intensity than those obtained from samples stored without any additives or stabilizers.

In a separate experiment, blood samples were stored for 90 days at room temperature following admixture of the blood with one of formulations 3.1, 3.2 or 3.3 (Table 3) at volume:volume ratios of 2:1, 4:1 and 8:1. Control sample groups were stored without any additives or stabilizers at room temperature or at -20°C . In electrophoretic analyses of DNA recoveries following purification using commercially available kits (QIAamp™ miniDNA kit or FlexiGene™ kit from Qiagen, Valencia, Calif., or ChargeSwitch™ kit from Invitrogen, Carlsbad, Calif.), well resolved bands were observed for samples stored using formulations 3.1, 3.2 and 3.3, having intensities greater than or comparable to those observed for the -20°C . control groups, which were in turn of greater intensity than those obtained from samples stored without any additives or stabilizers.

In another study, RNA integrity (RIN) scores were generated using the methods described above, for RNA recovered from blood samples that were stored at room temperature for seven days following admixture with one of formulations 3.4-3.7 (Table 3). Averaged RIN scores for formulations 3.4-3.7 ranged from approximately 6.47 to 6.83, compared to an average RIN score of 6.37 for samples stored without additives and an average RIN score of 7.7 for control samples stored at -80°C .

RNA stabilization in a blood sample that was stored at room temperature following admixture with formulation 3.4 (Table 3) was assessed by RT-qPCR analysis of changes in the levels of detectable (i.e., stabilized) human FOS and IL-1 β gene transcripts after zero, one, three and seven days, using β -actin expression as a reference standard. One set of control samples containing no stabilizing additive was stored at -80°C ., and a second set of control samples (also with no additive) was stored at room temperature. For both FOS and IL-1 β gene transcription levels, RNA from samples stored in formulation 3.4 yielded RT-qPCR results that were substantially similar to those obtained from the -80°C . control samples at each time point. By contrast, the room temperature control samples yielded qPCR results suggestive of artifactually elevated FOS expression (e.g., by way of

non-limiting theory, due to biased degradation of non-FOS-encoding RNA species) and wide fluctuations over time in IL-1 β expression.

Example 11

Stabilization of RNA and DNA in Human Blood Samples Stored without Refrigeration

Human whole blood from a single donor was stored at room temperature for three or seven days in formulation 3.4 (Table 3, 3:1 ratio of formulation to blood, FIG. 8C-8D) or for three days in the absence of stabilizer (unprotected, FIG. 8A). Control blood aliquots were stored for seven days at -80° C. Changes in the gene expression of a panel of 89 genes were analyzed in triplicate, relative to gene expression levels at the time of blood collection, using the $\Delta\Delta C_q$ method and RPL13A and GAPDH as housekeeping genes. Genes with identical expression levels at time zero and at a specified test time point fell on the linear plot (FIG. 8A-D). Boundaries on the scatter plots were set at two-fold, such that genes that were apparently up-regulated by more than two-fold appeared above the linear plot (FIG. 8A-D) and genes that were apparently down-regulated by more than two-fold appeared below the linear plot (FIG. 8). Gene abbreviations are indicated in FIG. 8.

Table 5 summarizes RT-qPCR analysis of apparent gene expression stability in whole blood samples stored at room temperature, for a larger panel of gene transcripts, compared as described above for human FOS and IL-1 β gene transcripts. Human whole blood was collected from a single donor and stored at room temperature in formulation 3.4 (Table 3) (3:1 ratio of formulation to blood), in PAXgene™ (Qiagen, Valencia, Calif.) or in the absence of an added stabilizer (unprotected). Control blood aliquots were stored without stabilizer at -80° C. Changes in the apparent gene expression of a panel of 89 genes were analyzed relative to gene expression levels at the time of blood collection (time zero), in triplicate samples of each condition, using the $\Delta\Delta C_q$ method, and RPL13A and GAPDH as housekeeping genes.

TABLE 5

| RT-QPCR SUMMARY | | | |
|-----------------------------------|-------------------------------|---------------------------------|----|
| SAMPLE | # GENES > 2-FOLD UP-REGULATED | # GENES > 2-FOLD DOWN-REGULATED | % |
| Room Temp. 3 days no additive | 12 | 22 | 34 |
| -80° C., 7 days No additive | 1 | 5 | 7 |
| Room Temp. 3 days Formulation 3.4 | 3 | 6 | 10 |
| Room Temp. 7 days Formulation 3.4 | 2 | 9 | 13 |
| Room Temp. 3 days PAXgene™ | 10 | 5 | 18 |
| Room Temp. 7 days PAXgene™ | 9 | 16 | 30 |

In a separate experiment, RNA integrity (RIN) scores were determined as described above, for RNA recovered from human blood samples stored at room temperature for 12 days. The results are shown in FIG. 9. The integrity of

RNA recovered from blood samples containing the herein described formulations 3.4, 3.20 or 3.22 (see Table 3), or PAXgene™, was compared to the integrity of RNA extracted from blood that had been stored unprotected at room temperature (i.e., without additives) and to RNA from control samples that were stored frozen at -20° C. Total RNA was extracted using the RNAqueous™ Kit (Ambion, Austin, Tex.) and RNA integrity was analyzed using the Agilent 2100 Bioanalyzer and the RNA 6000 Nano Kit. RIN scores are indicated in FIG. 9.

In another study, blood from a single donor was collected and aliquoted for storage at room temperature, either unprotected (i.e., without any additives as stabilizers), or in formulations 3.20, 3.21, 3.23, 3.24, 3.25 (see Table 3), or in PAXgene™. Control blood aliquots were stored frozen at -80° C. RNA was extracted from samples at the time of collection ("time 0") and after storage for seven days at the indicated temperature. RT-qPCR analysis was performed essentially as described above, to characterize changes in apparent expression of the genes encoding FOS and IL-1 β in samples following storage, relative to apparent expression levels at time "0". Human β -actin was used as the reference gene for this analysis. The results are presented in FIG. 10.

A similar analysis was conducted for samples stored for 14 days instead of seven, and for an expanded set of genes that included IL-16 and 18S rRNA. Blood from a single donor was collected and aliquoted for storage at room temperature, either unprotected (i.e., without any additives as stabilizers), or in formulations 3.20, 3.21, 3.23, 3.24, 3.25 (see Table 3), or in PAXgene™. Control blood aliquots were stored frozen at -80° C. RNA was extracted from samples at the time of collection ("time 0") and after storage for 14 days at the indicated temperature. RT-qPCR analysis was performed essentially as described above, to characterize changes in apparent expression of the genes encoding FOS, IL-1 β , IL-16 and 18S rRNA in samples following storage, relative to apparent expression levels at time "0". Human β -actin was used as the reference gene for this analysis. The results are presented in FIG. 11.

Example 12

Stabilization of DNA in Human Blood Samples Stored for Greater than Six Months without Refrigeration

Blood from a single donor was aliquoted into microfuge tubes at 100 μ L per tube. Tubes received 20 μ L of one of the formulations 3.26, 3.27, 3.28, 3.29, 3.30, 3.31 and 3.32 (see Table 3) and were then mixed with the blood by vortexing (i.e., one part stabilizer to five parts blood, (v/v)). Control blood aliquots (100 μ L) were also stored at room temperature unprotected (i.e., without added stabilizer) and additional control blood aliquots were stored frozen at -20° C. The tubes (other than the -20° C. control group) were stored on a laboratory benchtop at ambient room temperature for 189 days. Following the storage period, all tubes were extracted using a QiaAmp™ mini kit from Qiagen (Valencia, Calif.) according to the manufacturer's instructions. Extracted DNA was analyzed by electrophoresis on a 0.8% agarose gel containing ethidium bromide to examine the integrity of the genomic DNA. Well resolved bands that compared favorably in resolution and intensity with the bands seen in the -20° C. control samples were observed for samples that had been stored at room temperature in for-

ulations 3.26, 3.27, 3.31 and 3.32. The unprotected samples stored at room temperature exhibited significant degradation.

Unless the context requires otherwise, throughout the present specification and claims, the word “comprise” and variations thereof, such as, “comprises” and “comprising” are to be construed in an open, inclusive sense, that is as “including, but not limited to”.

Reference throughout this specification to “one embodiment” or “an embodiment” or “an aspect” means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of the phrases “in one embodiment” or “in an embodiment” in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments.

The various embodiments described above can be combined to provide further embodiments. All of the U.S. patents, U.S. patent application publications, U.S. patent applications, foreign patents, foreign patent applications and non-patent publications referred to in this specification and/or listed in the Application Data Sheet are incorporated herein by reference, in their entirety. Aspects of the embodiments can be modified, if necessary to employ concepts of the various patents, applications and publications to provide yet further embodiments.

These and other changes can be made to the embodiments in light of the above-detailed description. In general, in the following claims, the terms used should not be construed to limit the claims to the specific embodiments disclosed in the specification and the claims, but should be construed to include all possible embodiments along with the full scope of equivalents to which such claims are entitled. Accordingly, the claims are not limited by the disclosure.

From the foregoing, it will be appreciated that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

What is claimed is:

1. A composition for stable storage of nucleic acid and polypeptide molecules in a biological sample at room temperature, comprising:

(a) an imidazolium salt comprising:

- i) a compound selected from the group consisting of: 1-benzyl-3-hexylimidazolium, 1-methyl-3-carboxyethylimidazolium, 1-hexyl-3-methylimidazolium, 1-decyl-3-methylimidazolium, and 1-(2-hydroxyethyl)-3-methylimidazolium; and
- ii) a pharmaceutically acceptable anion;

(b) two or all three of:

- (i) at least one precipitating agent,
- (ii) at least one lower alcohol, wherein the lower alcohol is a straight or branched carbon chain alcohol of no more than 8 carbons, and
- (iii) at least one chaotrope;

(c) a chelating agent, a reducing agent, or a combination thereof;

(d) one or more pH buffers; and

(e) water,

wherein the composition is an aqueous solution and the imidazolium salt of (a) is present in the composition at a concentration of about 0.1% to about 10% (w/v).

2. The composition of claim 1 wherein the imidazolium salt of (a) is selected from the group consisting of:

- 1-benzyl-3-hexylimidazolium bromide,
- 1-methyl-3-carboxyethylimidazolium bromide,
- 1-hexyl-3-methylimidazolium bromide,
- 1-decyl-3-methylimidazolium bromide, and
- 1-(2-hydroxyethyl)-3-methylimidazolium bromide.

3. The composition of claim 1 wherein the precipitating agent is selected from the group consisting of:

- 5-(4-dimethyl)amino benzylidene rhodanine,
- sulfosalicylic acid,
- lithium chloride, and
- lithium hydroxide.

4. The composition of claim 1 wherein

the lower alcohol is selected from the group consisting of methanol, ethanol, n-propanol, isopropanol, n-butanol, and isobutanol (2-methylpropan-1-ol);

the chaotrope is selected from the group consisting of: guanidine hydrochloride, guanidine thiocyanate, potassium thiocyanate, sodium thiocyanate and urea; the chelating agent is selected from the group consisting of diethylenetriaminepentaacetic acid (DTPA), ethylenediaminetetraacetic acid (EDTA), ethylene glycol tetraacetic acid (EGTA), trans-1,2-diaminocyclohexane-N,N,N',N'-tetraacetic acid (CDTA), 1,2-bis(2-aminophenoxy)ethane-N,N,N',N'-tetraacetic acid (BAPTA), 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA), N-(2-hydroxyethyl)ethylenediamine-N,N',N'-triacetic acid, and nitrilotriacetic acid (NTA);

the reducing agent is selected from the group consisting of 2-mercaptoethanol, thiosulfate, TCEP (tris-(2-carboxyethyl) phosphine), dithiothreitol and dithioerythritol; and

the pH buffer is selected from the group consisting of citric acid, tartaric acid, malic acid, sulfosalicylic acid, sulfoisophthalic acid, oxalic acid, borate, CAPS (3-(cyclohexylamino)-1-propanesulfonic acid), CAPSO (3-(cyclohexylamino)-2-hydroxy-1-propanesulfonic acid), EPPS (4-(2-hydroxyethyl)-1-piperazinepropanesulfonic acid), HEPES (4-(2-hydroxyethyl)piperazine-1-ethanesulfonic acid), MES (2-(N-morpholino)ethanesulfonic acid), MOPS (3-(N-morpholino)propanesulfonic acid), MOPSO (3-morpholino-2-hydroxypropanesulfonic acid), PIPES (1,4-piperazinediethanesulfonic acid), TAPS (N-[tris(hydroxymethyl)methyl]-3-aminopropanesulfonic acid), TAPSO (2-hydroxy-3-[tris(hydroxymethyl)methylamino]-1-propanesulfonic acid), TES (N-[tris(hydroxymethyl)methyl]-2-aminoethanesulfonic acid), bicine (N,N-Bis(2-hydroxyethyl)glycine), tricine (N-[Tris(hydroxymethyl)methyl]glycine), tris (tris(hydroxymethyl)aminomethane) and bis-tris (2-[Bis(2-hydroxyethyl)amino]-2-(hydroxymethyl)-1,3-propanediol).

5. The composition of claim 1 which further comprises a surfactant or a detergent.

6. The composition of claim 1, wherein the imidazolium salt of (a) is 1-hexyl-3-methylimidazolium bromide, the chaotrope is guanidine hydrochloride, the pH buffer is tartaric acid and oxalic acid, the precipitating agent is lithium hydroxide, and the chelating agent is diethylenetriaminepentaacetic acid (DTPA).

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7. An admixture of a biological sample and a composition of claim 1, comprising a stably-stored nucleic acid molecule from said biological sample.

8. An admixture of a vertebrate blood sample and a composition of claim 1, comprising a stably-stored nucleic acid molecule from said vertebrate blood sample.

9. An admixture of a human blood sample and a composition of claim 1, comprising a stably-stored protein molecule or polypeptide molecule from said human blood sample.

10. The admixture of claim 7, wherein the sample is selected from the group consisting of DNA, RNA, blood, buffy coat from blood, urine, feces, serum, serosal fluid, plasma, lymph, cerebrospinal fluid, saliva, mucosal secretion, vaginal fluid, ascites fluid, pleural fluid, pericardial fluid, peritoneal fluid, abdominal fluid, buccal cells, bacteria, organ culture, cell culture, viruses, yeast cells, plasmid DNA, mRNA, tRNA, rRNA, siRNA, micro RNA, hnRNA, cDNA, a vaccine, a cell, a sorted or selected cell, a tissue, a cell lysate, homogenate or extract, a tissue lysate, homogenate or extract, a blood sample, biopsy specimen, tissue explant, organ culture and a biological fluid.

11. A method for substantially stabilizing one or a plurality of nucleic acid or polypeptide molecules that are present in a biological sample, comprising:

(a) admixing the biological sample with the composition of claim 1 to obtain a mixture; and

(b) maintaining the mixture without refrigeration for a time period of at least 7 days, and thereby substantially stabilizing said one or a plurality of nucleic acid or polypeptide molecules that are present in the biological sample, wherein either one, two or all three of:

(i) degradation is substantially prevented of at least 70% of recoverable DNA in the mixture, relative to an amount of DNA or polypeptide that is recoverable from the sample when stored for the time period at -20° C. without the composition of claim 1,

(ii) degradation is substantially prevented of at least 70% of recoverable RNA in the mixture, relative to an

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amount of RNA that is recoverable from the sample when stored for the time period at -80° C. without the composition of claim 1, and

(iii) degradation is substantially prevented of at least 70% of recoverable polypeptide molecules in the mixture, relative to an amount of polypeptide molecules that is recoverable from the sample when stored for the time period at -20° C. without the composition of claim 1.

12. The method of claim 11 wherein the biological sample is selected from:

(a) a biological sample that comprises vertebrate blood, (b) the biological sample of (a) wherein the vertebrate blood is unfractionated,

(c) a biological sample that comprises human blood,

(d) the biological sample of (c) wherein the human blood is unfractionated,

(e) a biological sample that is selected from the group consisting of DNA, RNA, blood, blood buffy coat, urine, feces, serum, serosal fluid, plasma, lymph, cerebrospinal fluid, saliva, mucosal secretion, vaginal fluid, ascites fluid, pleural fluid, pericardial fluid, peritoneal fluid, abdominal fluid, buccal cells, bacteria, organ culture, cell culture, viruses, yeast cells, plasmid DNA, mRNA, tRNA, rRNA, siRNA, micro RNA, hnRNA, cDNA, a protein, a polypeptide, a glycoprotein, a vaccine, a cell, a sorted or selected cell, a tissue, a cell lysate, homogenate or extract, a tissue lysate, homogenate or extract, a blood sample, biopsy specimen, tissue explant, organ culture and a biological fluid.

13. The method of claim 11 wherein the step of maintaining comprises maintaining for a time period of at least 10, 20, 30, 40, 50, 60 or 70 days.

14. The composition of claim 1 wherein the pharmaceutically acceptable anion is selected from the group consisting of bromide, chloride, iodide, C_1 - C_{12} alkylsulfonate, hexafluorophosphate, methylsulfate, ethylsulfate, tetrafluoroborate, trifluoromethanesulfonate, and bis(trifluoromethylsulfonyl)imide.

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